U.S. ENVIRONMENTAL PROTECTION AGENCY

STATEMENT OF BASIS

for

Former Tecumseh Products Company Facility

100 East Patterson Street
Tecumseh, Michigan

EPA ID: MID 005 049 440

September 18, 2018

LIST OF ABBREVIATIONS

1,1,1-TCA - 1,1,1-richloroethane
AOC – Area of Concern
cis-DCE – Cis-1,2-Dichloroethene
CMP – Corrective Measures Proposal
cm/s – centimeters per second
COC(s) – Contaminant(s) of Concern
CSM – Conceptual Site Model
CSCR - Cumulative Site-Related Cancer Risk
EC – Engineering Control
EISB – Enhanced In-Situ Biodegradation
FD/RC – Final Decision & Response to Comments
ft bgs – Feet Below Ground Surface
GSI – Groundwater Surface Water Interface
HI – Hazard Index
HPT - Hydraulic Profiling Testing
HRSC – High Resolution Site Characterization
IC – Institutional Control
ISCO – In-Situ Chemical Oxidation
MDEQ – Michigan Department of Environmental Quality
MIP – Membrane Interface Probe
MNA – Monitored Natural Attenuation
NPDES – National Pollutant Discharge Elimination System
O&M – Operations and Maintenance
PA/VSI – Preliminary Assessment / Visual Site Inspection
PCE - Tetrachloroethene
POTW – Publicly-Owned Treatment Works
PRB – Permeable Reactive Barrier
RBCA – Risk-Based Corrective Action
RC – Restrictive Covenant
RCRA – Resource Conservation & Recovery Act
RSL – Regional Screening Level
SB – Statement of Basis
SSD – Sub Slab Depressurization
SSL – Soil Screening Level
SVE – Soil Vapor Extraction
SVOCs – Semivolatile Organic Compounds
SWMU(s) – Solid Waste Management Unit(s)
TCE - Trichloroethene
TPC – Tecumseh Products Company, Inc.
trans-DCE – Trans-1,2-Dichloroethene
UST(s) – Underground Storage Tank(s)
VOC(s) – Volatile Organic Compound(s)
VISL – Vapor Intrusion Screening Level

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Statement of Basis

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INTRODUCTION

This Statement of Basis (SB) for the former Tecumseh Products Company (TPC) Facility, also known as Tecumseh Compressor Company, 100 Patterson LLC, and Revival Commons, explains the U.S. Environmental Protection Agency's proposed soil and groundwater remedies and institutional controls required at the Facility to protect human health and the environment. EPA will make a final decision on the TPC Facility remedy only after the public comment period has ended and the information submitted during this time has been reviewed and considered. As such, EPA is issuing this SB as part of its public participation responsibilities under the Resource Conservation and Recovery Act (RCRA).

This document summarizes information that can be found in greater detail in the following listed documents and other documents contained in the administrative record (Appendix A) for the Corrective Action Statement of Basis for the TPC Facility:

- *Revised Corrective Measures Proposal*, dated March 6, 2017.
- *Preliminary Assessment/Visual Site Inspection*, dated March 30, 1993.
- *Current Conditions Report*, dated September 21, 2009.
- *Administrative Order on Consent RCRA-05-2010-0012*, dated March 29, 2010.
- *Current Human Exposures Under Control Environmental Indicator Report*, dated September 29, 2011.
- *Construction Documentation Report, Permeable Reactive Barrier Downgradient of the Southern Source Area*, dated February 20, 2012.
- *Remedial Investigation and Groundwater Environmental Indicator Report*, dated September 28, 2012.
- *Full-Scale Soil Vapor Extraction System Construction Documentation Report, P-Building at 100 East Patterson Street*, dated February 13, 2013.
- *Supplement to the Current Human Exposures Environmental Indicator Report and Proposed Extension Pursuant to Paragraph 21 of the AOC*, dated September 30, 2013.
- *Vapor Intrusion Fact Sheet*, dated August 14, 2014.
- *Membrane Interface Probe* (MIP) *and Hydraulic Profiling Testing (HPT) Investigation Report*, dated December 5, 2014 and revised December 23, 2014.

- *MIP Investigation Report and Workplan for High Resolution Site Characterization (Revision 2),* dated April 30, 2015.
- *Supplement to Remedial Investigation and Environmental Indicator Report (Migration of Contaminated Groundwater Under Control),* dated July 31, 2015.
- *Notice of Violation*, dated October 1, 2015.
- *Summary of 2016 Soil Investigation Activities,* dated August 24, 2016.
- *City of Tecumseh Groundwater Use Ordinance*, recorded September 21, 2016.
- *Declaration of Restrictive Covenant*, recorded September 27, 2016.
- *Construction Documentation Report 2016 PCE Source Removal*, dated January 16, 2017.
- *Response to EPA Conditional Approval of Groundwater-Surface Water Interface Performance Monitoring Plan*, dated February 22, 2018.

EPA may modify this proposed decision or make another decision based on new information or public comments. Therefore, the public is encouraged to review and comment on this decision. The public can be involved in this process by reviewing this document and the documents contained in the administrative record file, and submitting comments to EPA during the public comment period set for October 29, 2018 to November 28, 2018. Although no public meeting has been scheduled as of the start date of the public comment period, members of the public may request a public meeting during the open public comment period. After the close of the public comment period, EPA will evaluate all written comments received from the public and will issue a Notification of Final Decision and Response to Comments (FD/RC).

PROPOSED REMEDY

Based on a comparative analysis of alternatives provided in the March 6, 2017 *Revised Corrective Measures Proposal* (CMP), EPA proposes the following remedy for public comment to address contaminated soil, groundwater, and soil vapor at the former TPC Facility.

- *Soil - A combination of: 1) maintenance of impermeable concrete/asphalt or placement and maintenance of similar cover over soils with contaminant concentrations above non-residential cleanup levels; 2) operation of the existing Soil Vapor Extraction* (SVE) *systems and expansion of the systems to additional areas of soil contamination; and, 3) source area soil excavation(s) and placement in a permitted off-site landfill.*

  The use of barriers such as existing/future asphalt (e.g., a parking lot) or concrete (e.g., building foundations, etc.) will be used to mitigate human exposure to contaminants via the inhalation pathway. Continued operation of the Facility's two SVE systems will remove volatile organic compounds (VOCs) in additional targeted areas of the Facility (Areas Soil-N1, Soil-S1 and Soil-S3) where soil contamination has the potential to leach to groundwater and migrate to off-site areas at levels above the residential screening criteria for vapor intrusion (a site-specific value of 130 parts per billion for trichloroethene, or TCE, the primary contaminant of concern, or COC). Approximately 3,250 tons of contaminated soil was excavated from one source area where tetrachloroethene (also called perchloroethylene or PCE) levels exceeded 88,000 parts

per million (the soil saturation limit for PCE) and replaced with clean soil backfill. These actions were considered an Interim Measure that reduced the potential for PCE leaching into groundwater. EPA estimates that an additional 2,900 cubic yards (cu. yd.) of contaminated shallow soil must either be properly excavated and disposed, or treated by in-situ chemical oxidation (ISCO) in the Soil N-2 area. Cleanup in this area will mitigate the migration of contaminants of concern (COCs) from on-site soil to groundwater by soil leaching and reduce the mass of COCs in the source area, preventing further off-site migration of TCE in groundwater. Since the cleanup is primarily intended to target concerns related to contaminated soil leaching to groundwater, appropriate controls will need to be proposed, installed, maintained and recorded on the Restrictive Covenant (RC) to address any COCs remaining which exceed the cleanup goals for any applicable exposure pathways.

- *Groundwater – A combination of: 1) potable well decommissioning; 2) use of a municipal groundwater ordinance; 3) use of a permeable reactive barrier (PRB); 4) enhanced in-situ bioremediation via recirculation cells; and, 5) monitored natural attenuation.*

  To prevent the ingestion of contaminated groundwater, potable wells within approximately 0.65 square miles surrounding the facility have been located and decommissioned, and a City Groundwater Ordinance was put in place to prevent the installation of wells for potable purposes within the affected area. A PRB was constructed as an Interim Measure to reduce the shallow groundwater concentrations beneath structures above the plume. On-site Enhanced In-Situ Bioremediation (EISB) will improve the natural biological degradation process and reduce the mass, toxicity, mobility and/or volume of organic contaminants in groundwater. The objective is to be protective of the on-site non-residential and off-site residential vapor intrusion pathways by reducing groundwater contaminant mass and achieving media cleanup standards. Monitoring of groundwater, soil gas and indoor air will continue during the treatment period and beyond to ensure conditions remain protective. Following treatment, the groundwater will remain contaminated above maximum contaminant levels (MCLs), and will be monitored to ensure that groundwater continues to meet the site-specific cleanup criteria, and concentrations continue to reduce via monitored natural attenuation (MNA) in on-site and off-site areas.

- *Surface Water – Surface water will be monitored via implementation of a Groundwater Surface Water Interface Monitoring Program.*

  Monitoring will be performed under a Groundwater Surface Water Interface Monitoring Program until on-site groundwater treatment achieves and maintains the Cleanup Goal for discharges to the wetland (in addition to the cleanup goal for off-site residential vapor

intrusion and surface water protection), via on-site groundwater treatment and off-site MNA.

- *Institutional Controls – Maintain Michigan Department of Environmental Quality (MDEQ)/EPA-approved institutional controls to ensure the facility's land use remains consistent with the remedial endpoints and risk assessments.*

  Institutional controls (ICs) are in-place and include an on-site nonresidential property use restriction, a requirement to protect and maintain investigation and cleanup wells and systems, a (municipal) prohibition on the installation or use of drinking water or groundwater extraction wells, a restriction against the relocation of contaminated soil on the property except under an EPA/MDEQ-approved soil management plan, a requirement for vapor intrusion testing or for on-site vapor intrusion controls using Sub-Slab Depressurization (SSD) systems for all current/future buildings, and a requirement for the maintenance or post-removal replacement of impervious surfaces at the property. A Restrictive Covenant (RC) was reviewed and approved by MDEQ and EPA then recorded with the Lenawee County Register of Deeds on September 27, 2016. The RC is enforceable under Part 111, Hazardous Waste Management, Michigan Compiled Laws (MCL) 324.11101 *et seq.* (Part 111) and the applicable sections of Part 201, Environmental Remediation, MCL 324.20101 *et seq*. (Part 201) of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), MCL 324.11101, *et seq*., (Part 111) and the applicable sections of Part 201, Environmental Remediation, MCL 324.20101, *et seq*., (Part 201) of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), MCL 324.101, *et seq*., and the administrative rules promulgated pursuant to those Parts, MAC R 299.9101, *et seq*., and MAC R 299.5101, *et seq*., and the Solid Waste Disposal Act, commonly referred to as the Resource Conservation and Recovery Act of 1976 (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984, 42 United States Code (U.S.C.) §§ 6901, *et seq*., and will ensure continued protection of human health and the environment. In addition, a municipal groundwater use restriction (Ordinance #4-11) was recorded with the Lenawee County Register of Deeds on September 21, 2017, which prohibits the use or installation of private water wells within a defined area of the City of Tecumseh.

- *Financial Assurance - Provide funds to complete the remedy including long-term O&M.*

  The total estimated cost of EPA's proposed remedy is approximately $5,441,650.00. Financial assurance is required to ensure that the proposed remedy can be implemented over its expected lifetime of 15 years. The facility owner will provide updated cost estimates for implementation of remedies and unless additional costs are determined to be necessary, Financial Assurance will be maintained at the current level until EPA

determines that the on-site and off-site cleanup objectives have been met, and will include up to 55 years of periodic, long-term, MNA monitoring.

- *Operations & Maintenance, Annual Certifications and Five-Year Remedy Reviews - Implemented to verify effective site controls and evaluate the remedy if needed.*

  An Operations and Maintenance (O&M) plan will need to be developed for monitoring remedial system components, including the groundwater treatment systems, SVE systems, and SSD systems. Quarterly performance reporting will be performed for a minimum of two years following system start-up. Reporting frequency may be reduced after conditions appear to be stable for all media, to a frequency not less than annually, and will document that existing engineering and institutional controls remain in-place and are preventing exposure. Periodic (5-year) remedy reviews will be conducted and the results will be used to evaluate reductions in chemical concentrations, the success of MNA, remedy efficacy, and to adjust the conceptual site model (CSM) if necessary.

FACILITY BACKGROUND

Location and History

The former TPC Facility contains large number of interconnected buildings/building additions that are in the process of being demolished; operations once occupied approximately 750,000 square feet on approximately 53 acres of land. The Facility address is 100 East Patterson Street, Tecumseh, Michigan located in Lenawee County (Appendix 2, Figure 1). The land is zoned as Industrial. The Facility property is bounded on the west by Evans Street and a manufacturing building located south of a residential area. To the north is Patterson Street, followed by Industrial/Commercial Properties and residences that pre-dated the industrial zoning. To the east are miscellaneous commercial/light industrial properties and residences that pre-dated industrial zoning, followed by a wetland and the River Raisin. To the south of the Facility is a commercial warehouse and fire station, in addition to other properties that are zoned as industrial. This area as described is considered the area subject to RCRA and will be referred to as the Facility.

The Tecumseh Compressor Company (Tecumseh Products Company, Inc.) Facility was acquired by TPC in 1934. The Facility was originally used to produce automotive parts, refrigeration systems, small tools and toys, and later for reconditioning compressors and condensing units for refrigeration and air conditioning units. Prior to TPC's acquisition of the property, portions had originally been developed by various industrial users by the late 1800s, including foundries and fence and wire manufacturers. Significant manufacturing processes previously conducted by TPC at the Facility included parts degreasing, unit assembly, paint preparation, unit painting, unit reconditioning and shipping and receiving, including use of an on-site rail spur until the 1960s. Manufacturing operations ceased at the Facility in June 2008, and it was sold in 2010.

TPC has owned the property since 1934, though past industrial owners have operated on the property, including Tiffany Iron Works (iron foundry); Heesen Brothers and Company (feed cookers, hog rings and hollowware); Carson Foundry and Manufacturing/Bruce Manufacturing (job castings and food cookers); Anthony Fence Company/American Steel and Wire Company (steel wire and woven wire fencing); and H. Brewer Company (concrete mixers and general foundry products). During TPC's operation, the uses of the Facility have not changed significantly, other than changes in some product lines, several episodes of facility expansion, and various levels of development until June 2008.

Materials Used and Wastes Generated

The predominant wastes generated by the former TPC Facility include solvent distillation sludge (F001), spent mineral spirits (D001), paint waste (D007), waste oil (F002), scrap metal and fines, iron phosphate, and citric acid solution. Past Facility operations reportedly included the use of trichloroethene (TCE) in the degreasing process, until the company switched to the use of 1,1,1-trichloroethane (1,1,1-TCA) along with water-based solvents. The wastes were generated during the manufacturing and rebuilding of compressor and refrigeration units and were stored in a former Spent Solvent Storage Tank and a Hazardous Waste Drum Storage Area (both decommissioned in 1979), in addition to less than 90-day accumulation areas and Waste Oil Storage Tanks. After closure of the Spent Solvent Storage Tank and Hazardous Waste Drum Storage Area in 1979 (officially "RCRA closed" in 1982), RCRA hazardous wastes were temporarily stored in containers in drum storage areas and removed off-site to a RCRA-permitted treatment facility within 90 days of generation.

Wastewater treatment was performed at two locations at the Facility; one within the west-central portion of the main building, and another at a newer Wastewater Treatment System built in 1994 and located in a separate building east of the main building. These systems treated process wastewater that contained suspended solids, water-based cleaning compounds, coolants, and a trace amount of oil and solvents. Wastes generated included filter cake from water filtration, solids from the settling process, and residual oil that was skimmed off and managed with all other waste oil generated at the Facility (solvent waste code F002). Treated wastewater was discharged to the City of Tecumseh publicly-owned treatment works (POTW).

Waste citric acid and iron phosphate solutions were generated during the cleaning and priming of the units prior to the painting process. The two waste streams were collected in 55-gallon drums and emptied into the Wastewater Treatment System.

Paint waste was generated from the cleaning of paint areas, which included the scraping of paint from the sides of the paint conveyor system. Such waste was accumulated in 55-gallon drums and stored at a Paint Waste Accumulation Area and transferred to the Hazardous Waste Drum Storage Area before pick-up for treatment and disposal.

A Distillation Solvent Recovery System located in the far southeastern portion of the building was used to distill spent 1,1,1-TCA from two vapor degreasers. The vapor degreasers were used to clean motors and parts before unit assembly. Clean solvent was recycled back into the vapor degreasers and sludge from the distillation of the spent 1,1,1-TCA was stored in the Hazardous Waste Drum Storage Area before off-site disposal. Prior to use of the recovery system, TPC managed spent 1,1,1-TCA in the former hazardous waste storage tank.

Waste oil was generated during the following operations: maintenance of plant machinery; drainage of oil from compressors and motors, and removal of oil from the skimmers that operated as a part of the Wastewater Treatment System. Maintenance of machinery as a part of site operations generated waste hydraulic oil. Waste oil was collected in the 6,000-gallon Waste Oil Storage Tank.

Metal fines and scrap metal were generated during the machining process and replacement of worn parts. These were collected and placed in Scrap Metal Bins in various areas before being sold to foundries or recycling facilities.

Historical Facility records indicated that at least 18 underground storage tanks (USTs) were present at the site. Fifteen of the USTs were listed in the MDEQ UST database, and ranged in size from 6,000 to 20,000 gallons; the USTs were used for storage of lubricating oils, lap oil, kerosene, used oil, fuel oil, and hazardous substances. The USTs, were installed between 1946 and 1970, and were located immediately west of the central part of the building. Three of the tanks were abandoned in place, and the remaining tanks were removed from the ground between July 1990 and November 1990. In addition, three tanks that were not in the MDEQ UST database were identified, including a two-compartment, 20,000-gallon tank located beneath the floor of the former wastewater treatment area which reportedly had been pumped out and filled with sand in 1990, and two additional USTs (a 20,000-gallon quench oil tank and a 6,000-gallon alcohol tank) that were removed in November 1987.

Site Geology and Hydrogeology

The Facility geology consists of a series of unconsolidated glacial deposits, predominantly gravel and sand with areas of silt and clay overlying Mississippian age shales. Soil at the Facility consists of a surficial silty/sandy clay interval ranging from 3 to 7 feet thick, underlain by unconsolidated fine to coarse sand and gravel to depths ranging from approximately 25 to 50 feet below ground surface (ft bgs) or more, depending upon the location and site topography, which dips sharply to the east towards the River Raisin. A continuous clay layer that is a minimum of 5 feet thick is present below the sand and gravel deposits, serving as an aquitard for the shallow groundwater aquifer. Well logs from borings in other areas of Tecumseh indicate that alternating layers of sand and clays can be present to depths of 200 ft bgs. Information has not been collected regarding the stratigraphy at deeper depths at the Facility. The bedrock underlying Lenawee County is expected to be the Coldwater Shale, which is reportedly first encountered at depths of between 100 to 250 feet.

The shallow groundwater unit is present at a depth ranging from approximately 5 ft bgs to more than 30 ft bgs within the sand and gravel unit, which reaches a depth of approximately 63 ft bgs northeast of the site. Investigation work indicates the water-bearing sand unit has an approximate hydraulic conductivity (K) of 1 x 10^{-2} centimeters per second (cm/s), but significant variations in K values occur due to the distribution of gravel or silt within the sand. The deeper clay layer has a K value of approximately 1 x 10^{-8} cm/s. The horizontal hydraulic gradient of the water table on-site is approximately 0.001 ft/ft, but is much higher near the eastern perimeter of the site, where the elevation further east of the site decreases significantly towards the River Raisin. The vertical hydraulic gradient of the site is essentially neutral, but a significant vertical downward gradient (-0.68 ft/ft) exists in the upper sand/gravel aquifer east/southeast of the site. Groundwater flows east across the Facility with a calculated groundwater flow velocity of approximately 30 feet per year.

Several shallow private water supply wells within the area subject to the groundwater ordinance were previously decommissioned by TPC. Water for the majority of the City of Tecumseh, including the area of the groundwater ordinance, comes from public water supply wells. The city well fields are located within 0.3 miles west (upgradient) of the Facility and much further north of the Facility. The well field west of the TPC Facility is positioned within the shallow, unconsolidated sand and gravel aquifer, and monitoring wells near the western property boundary have shown marginal or no contamination is present.

Surface Water

The nearest surface water feature is the River Raisin, located distances ranging from approximately 1,500 feet to 2,500 feet east of the Facility (Appendix 2, Figure 1).

Regulatory History and Corrective Action Background

TPC first submitted a Federal RCRA Part A permit application with EPA on March 17, 1981, to allow for container (S01) and tank (S02) storage of solvent wastes (F002 and F017). On June 10, 1982, EPA granted TPC interim status for the container storage and the tank storage areas. The permit allowed for tank storage of 2,500 gallons of hazardous waste and storage of up to 5,500 gallons (100 drums) of hazardous waste in containers.

On June 21, 1982, TPC submitted a closure plan for its container storage and 2,500-gallon spent solvent storage tank. EPA approved the closure plan, with final closure contingent on the submittal of a certification of closure for the storage tank. To satisfy EPA's October 18, 1982 conditional approval, a certificate of closure for the storage tank was submitted by McNamee, Porter, and Seeley Consulting Engineers on TPC's behalf on November 12, 1982. At that time, TPC became regulated as a generator of hazardous waste with less-than-90-day storage until 2008, when the plant closed.

Under the RCRA statute, the Interim Status Hazardous Waste Storage Facility owned by TPC remained subject to corrective action requirements for releases of hazardous wastes or constituents from any location where process wastes were stored, treated, disposed or routinely and systematically accumulated or released. Although such wastes may not meet the regulatory definition of RCRA hazardous wastes, they fall under the broader statutory definition of RCRA solid wastes. Locations where these wastes were managed or accumulated are defined as Solid Waste Management Units (SWMUs).

In 1993, EPA and its contractors performed a file review (Preliminary Assessment) and site visit (Visual Site Inspection), or PA/VSI, to identify SWMUs at the Facility and evaluate each for evidence of releases or the potential to release hazardous constituents. The PA/VSI identified the following 12 SWMUs at the Facility. These SWMUs are identified on Figure 2 in Appendix 2.

SWMUs:

1. Wastewater Treatment System
2. Metal Solids Bin
3. Underground Wastewater Storage Tanks
4. Final Holding Tank
5. Distillation Solvent Recovery System
6. Hazardous Waste Drum Storage Area
7. Citric Acid and Iron Phosphate Solution Accumulation Area
8. Scrap Metal Bins
9. Paint Waste Accumulation Area
10. Former Spent Solvent Storage Tank
11. Waste Oil Storage Tank
12. Metal Fines Storage

The PA/VSI indicated that no evidence of a release was visible at any of the SWMUs at the time of inspection.

EPA began working with TPC in 2009 when TPC was negotiating the sale of the property. TPC approached MDEQ to discuss entering the Part 201 program to address contamination identified at the Facility and subsequently negotiated a RCRA 3008(h) Administrative Order on Consent signed March 29, 2010 with EPA as the project lead. The main goals were to protect the community from potential exposures that could affect human health, establish control of the migration of contaminated groundwater off-site, and to conduct investigations and identify the corrective actions necessary under RCRA to allow for the reuse of the property by the new owner.

INVESTIGATIONS AND RISK ASSESSMENT

Industrial process wastes from manufacturing operations at the facility have been released into on-site soil and have leached to groundwater. Results included in a 2012 Remedial Investigation

and Groundwater Environmental Indicator Report and supplemental investigations conducted by TPC indicate that VOCs, including trichloroethene (TCE), PCE, 1,1,1-trichloroethane (1,1,1-TCA), cis-1,2-dichloroethene (cis-DCE), trans-1,2-dichloroethene (trans-DCE), xylene, and vinyl chloride (among others) are the primary COCs in the soil (from about 0 to 20 feet below ground surface, ft bgs). Based on their distribution and elevated concentrations, those VOCs are also considered the primary COCs in groundwater at the facility. Analysis of groundwater samples taken upgradient to the west of the Facility indicate that the contamination has not adversely impacted groundwater quality beyond the immediate area of the property line. However, downgradient to the east, groundwater contamination extends off-site in two directions at distances of up to 2,500 feet then discharges to the River Raisin. This is explained in more detail in the *Investigation Results* section of this SB.

To develop a Conceptual Site Model (CSM) of potential exposure of human and ecological receptors to contamination from the SWMUs, EPA and TPC evaluated the scenarios listed in Table 1, below:

Table 1: Potential Human Receptors and Exposure Pathways
Former Tecumseh Products Company Facility, Tecumseh, Michigan

Receptor	Pathways for Exposure
ON-SITE	
Routine Outdoor Workers	Inhalation of soil contaminants via volatilization to ambient air; Direct contact with surface soil; Inhalation of soil particulates and fugitive dust.
Routine Indoor Workers	Inhalation of volatile contaminants in indoor air (vapor intrusion); Hypothetical groundwater ingestion.
Non-Routine Outdoor Workers	Direct contact with groundwater (AOC-1 only); Inhalation of soil contaminants via volatilization to ambient air; Direct contact with surface soil; Inhalation of soil particulates and fugitive dust.
On-Site Environmental Workers	Direct contact with surface and sub-surface soils; Inhalation of soil contaminants via volatilization to ambient air; Inhalation of soil particulates and fugitive dust; and Direct contact with groundwater.
Trespassers	Inhalation of soil contaminants via volatilization to ambient air; Direct contact with surface soil; Inhalation of soil particulates and fugitive dust.
OFF-SITE	
Routine Outdoor Workers	Inhalation of soil[1] contaminants via volatilization to ambient air; Direct contact with surface soil[1]; Inhalation of soil[1] particulates and fugitive dust.
Routine Indoor Workers	Inhalation of volatile contaminants in indoor air (vapor intrusion); Hypothetical groundwater ingestion.
Non-Routine Outdoor Workers	Inhalation of soil[1] and groundwater contaminants via volatilization to ambient air; Direct contact with surface soil[1] and groundwater; Inhalation of soil[1] particulates and fugitive dust.
Environmental Workers	Direct contact with surface[1] and sub-surface soils; Inhalation of soil[1] and groundwater contaminants via volatilization to ambient air; Inhalation of soil[1] particulates and fugitive dust; and Direct contact with groundwater.

Receptor	Pathways for Exposure
Residents	Inhalation of volatile contaminants in indoor air (vapor intrusion); Inhalation of soil[1] contaminants via volatilization to ambient air; Direct contact with surface soil[1]; Inhalation of soil[1] particulates and fugitive dust; Hypothetical groundwater ingestion.
Recreational Users	Inhalation of soil[1] and groundwater contaminants via volatilization to ambient air; Direct contact with surface soil[1] and surface water; Inhalation of soil[1] particulates and fugitive dust.

[1] Exposure is hypothetical; no off-site data exists for surface or subsurface soil. Off-site soil impacts would only be related to soils in contact with contaminated groundwater at depth.

The risk assumptions for this Facility were evaluated based on the Facility's prior status as manufacturer, and its anticipated use for light industrial/commercial purposes in the foreseeable future. Much of the area where contamination is present is covered by the plant building or low-permeability pavement which prevents infiltration of precipitation and mobilization of contaminants into groundwater. Some of the areas were/are being addressed by implementing active Interim Measures, including operation of a permeable reactive barrier (PRB), an SVE system, and excavation/disposal.

Institutional controls previously developed and implemented for the Facility include a nonresidential deed restriction, a prohibition on the on-site use or installation of drinking water or groundwater extraction wells (except those related to cleanup), a prohibition on the relocation of contaminated soils onsite (except as allowed under Section 324.20120c of Michigan's Natural Resources and Environmental Protection Act), a prohibition on future permitting for treatment, storage, or disposal of hazardous wastes onsite, a requirement to complete a Soil Management Plan to be submitted for EPA's review before completing excavations in areas on high contamination, a requirement to maintain or reinstall and maintain impervious surfaces where required for operation of cleanup systems, a prohibition on installation of storm water detention basins, and a requirement to address vapor intrusion in on-site buildings (through testing/sampling of contaminants in the subsurface or installation of engineering controls to prevent vapor intrusion).

A soil management plan still needs to be developed to prevent the distribution of contaminated soil into areas with lower levels of contaminant impacts in soil during future excavation. Impervious barriers that are used as part of the final remedy (including those related to soil vapor management) will need to be surveyed, with the use of such barriers to eliminate exposure pathways recorded as amendments to the Restrictive Covenant to prevent damage to the barriers, and ensure long-term operations and maintenance of barriers until cleanup objectives are achieved. Any modifications to these current and proposed future restrictions will require EPA's reevaluation of exposure scenarios and/or approval as additional corrective measures.

EPA also evaluated the potential for exposure of on-site workers and off-site residents to vapor-phase contaminants via inhalation of volatile contaminants which could migrate to indoor air from a source beneath the buildings; or from volatile contaminants migrating out of shallow groundwater beneath off-site residential buildings (vapor intrusion pathways). Data from

monitoring wells both at the Facility and off-site showed that concentrations of certain VOCs in groundwater exceeded the EPA's vapor intrusion screening levels (VISLs) and therefore, the *potential* migration of VOCs from groundwater to indoor air represented a *potential* health risk concern. However, contaminant concentrations in indoor air samples in most of areas tested were below the current screening levels. For those properties where indoor air concentrations were above the screening criteria, or where individual residents preferred additional protections, the risks of exposure by vapor intrusion was further reduced by installing SSD Systems.

The ground surface is covered by structures, concrete, asphalt, or grass. No potentially endangered ecosystems have been identified within the Facility boundaries. As a result, there are no potential risks to endangered ecosystems on-site. Off-site, 1,500 feet to 2,500 feet to the east, is a wetland adjacent to the River Raisin. The potential for recreational exposure via direct contact or inhalation of volatiles or particulates from soil, or direct contact and incidental ingestion of contaminated surface water exist, based on concentrations near those screening criteria in the wetland area. Threats to the wetland have been confirmed based on water sample results with concentrations above MDEQ's default Groundwater-Surface Water Interface (GSI) criteria, which are derived from potential exposure to sensitive taxa and aquatic organisms.

Health Risk Screening Levels

To evaluate the health risk significance of soil and groundwater contamination at the Facility, EPA and TPC's consultants used default, pathway-specific Site Screening Levels (SSLs) for the chemical compounds used in manufacturing and their byproducts. This evaluation focused on the location of the Facility, area land use, and potential pathways of human exposure to contaminants according to EPA guidance. EPA requires that the screening criteria for each SSL have an allowable risk threshold, with a non-cancer Hazard Index (HI) of 1 or lower and a Cumulative Site-Related Cancer Risk (CSCR) of 1×10^{-5} or lower (i.e., 1 in 100,000). The default screening levels used in the evaluation of contaminant data at TPC meet these criteria.

Published sources that were used to select SSLs include:

- EPA Regional Screening Levels (RSLs) for groundwater and on-site worker and trespasser soil exposure scenarios.
- EPA Maximum Contaminant Levels (Federal regulatory standards for drinking water including groundwater used as drinking water).
- Michigan DEQ Part 201 Generic Criteria.
- Michigan Department of Environmental Quality Criteria for evaluating migration of volatile groundwater contaminants to indoor air at non-residential buildings.
- Michigan Department of Environmental Quality Criteria for evaluating migration of volatile soil contaminants to indoor air at non-residential buildings.
- Michigan Department of Environmental Quality Indoor Air Screening Levels for the Vapor Intrusion Pathway.

The screening criteria that were used for investigation of the TPC facility are listed in Tables 2-4 that follow.

Table 2: Soil Screening Level (SL) Criteria for TPC Risk Assessment
Former Tecumseh Products Company Facility, Tecumseh, Michigan

Detected Contaminant/COC	Soil Direct Contact SL for On-Site Worker or Trespasser (mg/kg)	Groundwater Protection SL for Soil (mg/kg)	Vapor Intrusion SL for Soil (mg/kg)
Organic Contaminants			
1,1-Dichloroethane	160	0.0078	7.3
1,1-Dichloroethene	3.7	0.10	1.2
Cis-1,2-Dichloroethene	9.3	0.011	0.17
Trans-1,2-Dichloroethene	72	0.11	0.76
Ethylbenzene	41	0.017	4.0
Naphthalene	24	0.0054	8.9
Tetrachloroethene	45	0.051	1.0
Toluene	3300	0.76	169
1,1,1-Trichloroethane	4000	2.8	66.6
Trichloroethene	1.4	0.0018	0.05
1,2,4-Trimethylbenzene	27	0.034	5.9
Vinyl Chloride	2.2	0.000065	0.04
Xylenes	580	0.19	4.9
Inorganic Contaminants			
Arsenic	7.6	4.6	NA
Barium	37,000	13,000	NA
Cadmium	550	6	NA
Chromium	2,500	30	NA
Lead	400	700	NA
Selenium	2,600	4.0	NA
Zinc	1,700	2,400	NA

SL = Screening Level Concentrations (EPA Regional Screening Levels or Michigan DEQ Part 201 Generic Criteria).
Criteria for soil are expressed in milligrams per kilogram (mg/kg).
NA = Not Available; No Criteria Available for this constituent.

Table 3: Groundwater Screening Level (SL) Criteria for TPC Risk Assessment
Former Tecumseh Products Company Facility, Tecumseh, Michigan

Detected Contaminant/COC	SL for Groundwater* (ug/L)	Vapor Intrusion SL for Groundwater (ug/L)	GSI/Surface Water Protection SL[1] (ug/L)
Organic Contaminants			
Benzene	4.6	140	200

Detected Contaminant/COC	SL for Groundwater* (ug/L)	Vapor Intrusion SL for Groundwater (ug/L)	GSI/Surface Water Protection SL[1] (ug/L)
Chloroethane	760	180,000	1100
Chloroform	2.2	720	350
1,1-Dichloroethane	7.0	1600	130
1,1-Dichloroethene	7.0	1600	130
Cis--1,2-Dichloroethene	36	350	620
Trans-1,2-Dichloroethene	100	1500	1500
1,4-Dioxane	4.6	29,000	2800
Ethylbenzene	15	2600	18
Tetrachloroethene	5.0	460	60
Toluene	790	150,000	270
1,1,1-Trichloroethane	200	71,000	89
Trichloroethene	2.8	41	200
1,2,4-Trimethylbenzene	15	7,300	17
Vinyl Chloride	0.19	52	13
Xylenes	190	10,000	41

SL = Screening Level Concentration (EPA Regional Screening Levels or Michigan DEQ Generic Criteria).
Criteria for groundwater are expressed in micrograms per liter (ug/L).
* Assumes groundwater could be used as drinking water.
[1] Based on Levels Protective of Receptors/Pathways at the Wetland (MDEQ default GSI criteria and cleanup goal).

Table 4: Vapor Phase Screening Level (SL) Criteria for TPC Risk Assessment Former Tecumseh Products Company Facility, Tecumseh, Michigan

Detected Contaminant/COC	Indoor Air SL (ppbv)	Sub-Slab Soil Gas SL (ppbv)	Deep Soil Gas SL (ppbv)
Organic Contaminants			
1,1-Dichloroethane	510	69,000	690,000
1,2-Dichloroethane	1.2	160	1,600
1,1-Dichloroethene	210	28,000	280,000
Cis-1,2-Dichloroethene	7.3	980	9,800
Trans-1,2-Dichloroethene	73	9,800	98,000
Tetrachloroethene	25	3,300	33,00
1,1,1-Trichloroethane	4,600	610,000	6,100,000
Trichloroethene	1.5	210	2,100
Vinyl Chloride	12	1,500	15,000

SL = Screening Level Concentrations (EPA Regional Screening Levels or Michigan DEQ Generic Criteria).
Criteria for vapor phase expressed in parts per billion volume (ppbv).
SL Criteria are from the EPA Vapor Intrusion Screening Levels Calculator or MDEQ Guidance for the Vapor Intrusion Pathway.

Investigations Conducted

EPA conducted a Preliminary Review/Visual Site Inspection (PA/VSI) at the Facility in 1993, during which 12 SWMUs were identified. During an investigation of the Facility related to its potential sale which was performed between December 2008 and January 2009, contamination was identified and TPC approached MDEQ and EPA about addressing the contamination. Under an Administrative Order on Consent (AOC) (RCRA-05-2010-0012), TPC sampled and analyzed the soil, soil gas, and groundwater throughout the Facility and assessed soil gas, storm water, surface water, and groundwater off-site. TPC targeted the known SWMUs and incidental site-wide releases to delineate the extent of the contamination. The work was performed in multiple phases, and the results are in reports including but not limited to:

- *Current Conditions Report,* dated September 21, 2009.
- *Current Human Exposures Under Control Environmental Indicator Report,* dated September 29, 2011.
- *Remedial Investigation and Groundwater Environmental Indicator Report,* dated September 28, 2012.
- *Second Quarter 2013 Progress Report,* dated July 15, 2013.
- *Supplement to the Current Human Exposures Environmental Indicator Report and Proposed Extension Pursuant to Paragraph 21 of the AOC,* dated September 30, 2013.
- *Summary of 2014 Passive Soil Gas Survey Activities,* dated June 18, 2014.
- *Third Quarter 2014 Progress Report,* dated October15, 2014.
- *MIP Investigation Report and Workplan for High Resolution Site Characterization (Revision 2),* dated April 30, 2015.
- *Supplement to Remedial Investigation and Environmental Indicator Report (Migration of Contaminated Groundwater Under Control),* dated July 31, 2015.
- *Third Quarter 2015 Progress Report (including 2015 High Resolution Site Characterization Report and Updated Conceptual Site Model),* dated October 15, 2015.
- *Revised Corrective Measures Proposal,* dated March 6, 2017.
- *Second Quarter 2017 Progress Report,* dated July 17, 2017.
- *Groundwater-Surface Water Interface Performance Monitoring Plan,* revised February 22, 2018.

TPC installed a network of approximately 288 temporary soil borings (soil borings, source area borings, Geoprobe™ borings, and MIP confirmation borings), 66 MIP borings, 76 permanent groundwater monitoring wells, 26 Soil Gas locations, and 19 PRB wells. These investigative borings and monitoring wells were installed near SWMUs and process areas, at property boundaries, and off-site (Appendix 2, Figures 1 and 2). Temporary borings and MIP borings were sampled once, and permanent groundwater wells, PRB wells and soil gas points have been sampled for consecutive years from the date of installation (2008-2016) through the present.

The results of the soil investigations are summarized in Table F1 in Appendix F of the CMP (VOCs only). Figures 14, 16, 17 and 18 of the CMP depict the generalized distribution of VOC contamination in the vadose zone soils. Soil sample analytical results for other contaminants were included as tables in the Current Conditions Report. The results of the groundwater investigations are summarized in various tables provided in Quarterly reports, and select VOC data is summarized in Tables F2 through F6 in Appendix F of the CMP. Figures 8, 9, 15, and 19 through 23 of the CMP depict the distribution of groundwater contamination.

A summary of constituents detected in soil, groundwater, and vapor phase at levels above the respective screening criteria is shown in Tables 5-7 on the pages that follow.

Table 5: Constituents of Concern Detected Above Screening Level Criteria in Soil Former Tecumseh Products Company Facility, Tecumseh, Michigan

Detected Contaminant/COC	Range of Detected Concentrations (mg/kg)	Screening Level Criteria Exceeded from Table 2	Evaluation of Health Risk or Remedial Response
Organic Contaminants			
1,1-Dichloroethane	0.037 - 0.75	Groundwater Protection	Install SVE systems, Maintain concrete slabs, and RC to prevent Groundwater use.
1,1-Dichloroethene	0.24 - 0.36	Groundwater Protection	Install SVE systems, Maintain concrete slabs, and RC to prevent Groundwater use.
Cis-1,2-Dichloroethene	0.031 - 27	Soil Direct Contact, Groundwater Protection and Vapor Intrusion	Soil Excavation, Install SVE systems, Maintain concrete slabs, and RC to prevent Groundwater use.
Trans-1,2-Dichloroethene	0.04 - 0.62	Groundwater Protection	Install SVE systems, Maintain concrete slabs, and RC to prevent Groundwater use.
Ethylbenzene	0.058 - 1.3	Groundwater Protection	Install SVE systems and RC to prevent Groundwater use
Naphthalene	0.31 - 14	Groundwater Protection and Vapor Intrusion	Install SVE systems and RC to prevent Groundwater use
Tetrachloroethene	0.032 - 520	Soil Direct Contact, Groundwater Protection and Vapor Intrusion	Soil Excavation, Install SVE systems and RC to prevent Groundwater use
Toluene	0.086 - 0.92	Groundwater Protection	Install SVE systems and RC to prevent Groundwater use
1,1,1-Trichloroethane	0.033 - 17	Groundwater Protection	Install SVE systems, Maintain concrete slabs, and RC to prevent Groundwater use.
Trichloroethene	0.038 - 140	Soil Direct Contact, Groundwater Protection and Vapor Intrusion	Soil Excavation, Install SVE systems and RC to prevent Groundwater use
1,2,4-Trimethylbenzene	0.037 - 34	Soil Direct Contact, Groundwater Protection and Vapor Intrusion	Soil Excavation, Install SVE systems and RC to prevent Groundwater use
Vinyl Chloride	0.041 - 0.55	Groundwater Protection and Vapor Intrusion	Install SVE systems and RC to prevent Groundwater use
Xylenes	0.22 - 9.4	Groundwater Protection and Vapor Intrusion	Install SVE systems and RC to prevent Groundwater use
Inorganic Contaminants			
Arsenic	5.6 - 8.3	Groundwater Protection	RC to prevent Groundwater use
Barium	130 - 260	None	

Detected Contaminant/COC	Range of Detected Concentrations (mg/kg)	Screening Level Criteria Exceeded from Table 2	Evaluation of Health Risk or Remedial Response
Cadmium	0.22 - 9	Groundwater Protection	RC to prevent Groundwater use
Chromium	6.8 - 24	None	
Lead	27 - 140	None	
Selenium	1.2 - 1.8	None	
Zinc	160 - 260	None	

Detections in soil are expressed in milligrams per kilogram (mg/kg).
SVE = Soil Vapor Extraction system.
RC = Restrictive Covenant.

Table 6: Constituents of Concern Detected Above Screening Level Criteria in Groundwater Former Tecumseh Products Company Facility, Tecumseh, Michigan

Detected Contaminant/COC	Range of Detected Concentrations (ug/L)	Screening Level Criteria Exceeded from Table 3	Evaluation of Health Risk or Remedial Response
Organic Contaminants			
Benzene	1 - 9	Groundwater Use	RC to prevent Groundwater use
Chloroethane	5 - 43	None	
Chloroform	1.1 - 3	Groundwater Use	RC to prevent Groundwater use
1,1-Dichloroethane	3 - 280	Groundwater Use & GSI/Surface Water Protection	RC to prevent Groundwater use, Install Permeable Reactive Barriers, Maintain concrete slabs, and/or In-Situ Bioremediation to reduce concentrations
1,1-Dichloroethene	2 - 920	Groundwater Use & GSI/Surface Water Protection	RC to prevent Groundwater use, Install Permeable Reactive Barriers, Maintain concrete slabs, and/or In-Situ Bioremediation to reduce concentrations
Cis-1,2-Dichloroethene	1 – 8,300	Groundwater Use, Vapor Intrusion & GSI/Surface Water Protection	RC to prevent Groundwater use, Perform soil gas sampling to determine need for SSD system to protect building occupants, Install Permeable Reactive Barriers, Maintain concrete slabs, and/or In-Situ Bioremediation to reduce concentrations
Trans-1,2-Dichloroethene	1 - 270	Groundwater Use	RC to prevent Groundwater use
1,4-Dioxane	1.5 - 1.7	None	
Ethylbenzene	0.5 - 3	None	
Tetrachloroethene	0.9 - 76,000	Groundwater Use, Vapor Intrusion & GSI/Surface Water Protection	RC to prevent Groundwater use, Perform soil gas sampling to determine need for SSD system to protect building occupants, Install Permeable Reactive Barriers and/or In-Situ Bioremediation to reduce concentrations
Toluene	3 - 62	None	
1,1,1-Trichloroethane	1.4 – 8,500	Groundwater Use and GSI/Surface Water Protection	RC to prevent Groundwater use, Install Permeable Reactive Barriers, Maintain concrete slabs, and/or In-Situ Bioremediation to reduce concentrations
Trichloroethene	3.0 - 12,000	Groundwater Use, Vapor Intrusion & GSI/Surface Water Protection	RC to prevent Groundwater use, Perform soil gas sampling to determine need for SSD system to protect building occupants, Install Permeable

Detected Contaminant/COC	Range of Detected Concentrations (ug/L)	Screening Level Criteria Exceeded from Table 3	Evaluation of Health Risk or Remedial Response
			Reactive Barriers, Maintain concrete slabs, and/or In-Situ Bioremediation to reduce concentrations
1,2,4-Trimethylbenzene	4.0 - 64	Groundwater Use and GSI/Surface Water Protection	RC to prevent Groundwater use, Install Permeable Reactive Barriers and/or In-Situ Bioremediation to reduce concentrations
Vinyl Chloride	1.8 – 1,900	Groundwater Use, Vapor Intrusion & GSI/Surface Water Protection	RC to prevent Groundwater use, Perform soil gas sampling to determine need for SSD system to protect building occupants, Install Permeable Reactive Barriers, Maintain concrete slabs, and/or In-Situ Bioremediation to reduce concentrations
Xylenes	ND	None	

Detections in groundwater are expressed in micrograms per liter (ug/L).
RC = Restrictive Covenant.
SSD = Sub Slab Depressurization system.
ND = The concentration of this constituent was below the analytical reporting limit in all samples.

Table 7: Constituents of Concern Detected Above Screening Level Criteria in Vapor Phase, Former Tecumseh Products Company Facility, Tecumseh, Michigan

Detected Contaminant/COC	Range of Detected Concentrations in Indoor Air (ppbv)	Range of Detected Concentrations in Sub-Slab Soil Gas (ppbv)	Range of Detected Concentrations in Deep Soil Gas (ppbv)	Screening Level Criteria Exceeded from Table 4	Evaluation of Health Risk or Remedial Response
Organic Contaminants					
1,1-Dichloroethane	ND	2.3 - 468	0.73 - 200	None	
1,2-Dichloroethane	0.65 - 1.5	17.8 - 474	1.6 to 166	SLs for Indoor Air and Sub-Slab Soil Gas	Potential for the constituent to cause unacceptable inhalation risk is addressed through installation of SVE and/or SSD Systems to protect current or future building occupants, monitoring, and groundwater treatment to reduce the generation of vapors
1,1-Dichloroethene	ND	29.9 - 4,360	2.1 - 31	None	
Cis-1,2-Dichloroethene	ND	49.3 – 1,030	1.0 - 1,300	SL for Sub-Slab Soil Gas	Potential for the constituent to cause unacceptable inhalation risk is addressed through installation of SVE and/or SSD Systems to protect current or future building occupants, monitoring, and groundwater treatment to reduce the generation of vapors
Trans-1,2-dichloroethene	ND	6.4 – 1,730	2.5 - 90.3	None	

Detected Contaminant/COC	Range of Detected Concentrations in Indoor Air (ppbv)	Range of Detected Concentrations in Sub-Slab Soil Gas (ppbv)	Range of Detected Concentrations in Deep Soil Gas (ppbv)	Screening Level Criteria Exceeded from Table 4	Evaluation of Health Risk or Remedial Response
Tetrachloroethene	0.17 -0.80	8.4 - 344	0.77 - 5,400	None	
1,1,1-Trichloroethane	2.5 - 19.2	13.0 – 436,000	0.81 - 12,000	None	
Trichloroethene	2.2 - 19.8	25.9 – 118,000	1.1 – 110,000	SLs for Indoor Air and Sub-Slab and Deep Soil Gas	Potential for the constituent to cause unacceptable inhalation risk is addressed through installation of SVE and/or SSD Systems to protect current or future building occupants, monitoring, and groundwater treatment to reduce the generation of vapors
Vinyl Chloride	ND	ND	1.0 – 3.3	None	

Detections in vapor phase expressed in parts per billion volume (ppbv).
ND = The concentration of this constituent was below the analytical reporting limit in all samples.

Investigation Results

TPC's consultants obtained and analyzed numerous soil samples at each SWMU and throughout the Facility to delineate the lateral and vertical extent of contaminant concentrations and to compare to the site risk-based screening levels. TPC's soil investigation targeted known process areas, and areas identified as impacted through passive soil gas surveys (Appendix 2, Figures 3 through 5) and MIP investigations (Appendix 2, Figures 6 and 7). TPC assessed and delineated groundwater contamination through the installation of temporary borings, permanent groundwater wells, MIP sampling, and high-resolution site characterization (HRSC) groundwater sampling (Appendix 2, Figures 8 through 12) both on-site and off-site. Based on the soil and groundwater results, TPC also performed sampling to determine contaminant levels in soil gas, indoor air, sediment pore water, and surface water in areas where the potential for impacts to those media were identified.

In 2009, investigation results identified contamination on-site and at the property lines. TPC identified the primary COCs, which included chlorinated hydrocarbon solvents and degradation products that were used in TPC's past operations, specifically, 1,1,1-TCA, TCE, cis-1,2-DCE, PCE and vinyl chloride. Semivolatile organic compounds (SVOCs) and metals were also present, but not at significantly elevated levels. Additional investigation identified elevated levels of impacts in the following general areas:

1. The former Steam Cleaning Room, Chemical Stock Room, and Degreaser in the northern portion of the building and contained TCE levels in soil up to 140 milligrams per kilogram (mg/kg) at NS-29. Groundwater contamination is highest downgradient from

these areas near the northeast corner of the Building where TCE levels up to 12,000 micrograms per liter (ug/L) were found at SB-MIP-57. Contamination extends off-site to the northeast. TCE concentrations in soil gas up to 17,100 parts per billion volume (ppbv) were measured below the building in the area at SV-01 and as high as 1,320 ppbv at SG-05.

2. The former Wastewater Treatment System and Parts Degreaser adjacent to the central portion of the building contained TCE up to 23 mg/kg in soil at NS-34. Groundwater is only moderately contaminated, but concentrations TCE concentrations in soil gas up to 118,000 ppbv were measured in the area at SV-11.
3. The former Compressor Washer and Paint Line and SWMUs 4, 5, 7, and 9 (the Final Holding Tank, Distillation Solvent Recovery System, Citric Acid and Iron Phosphate Solution Accumulation Area, and Paint Waste Accumulation Area, respectively) in the Southern portion of the building contained 1,1,1-TCA levels in soil up to 17 mg/kg. 1,1,1-TCA and TCE in groundwater were generally within the range of 1,000-2,000 ug/L at MW-34s. TCE concentrations in soil gas up to 103,000 ppbv were measured in the area at SV-15, and up to 110,000 ppbv at SG-01.
4. The grassy area in far southeastern portion of the property contained concentrations of PCE up to 520 mg/kg in soil. This area (Soil-S4, Appendix 2, Figure 13) is considered a previously unknown Area of Concern (AOC 1). Groundwater contamination is highest at AOC 1 and extends east towards the property line where PCE up to 76,000 ug/L, and TCE up to 8,900 ug/L were identified, and continuing off-site at lower levels. Soil gas concentrations were highest at SG-2 and SG-22 where TCE in the shallow groundwater had the highest levels of contamination (Appendix 2, Figure 7).

TPC's investigation identified that contaminated groundwater was present near the River Raisin east of the southern plume, leading to the collection of pore-water samples that contained low levels of TCE degradation products (vinyl chloride, cis-DCE and trans-DCE at PW-07), and also identified direct discharges to the surface water through seeps identified in the wetland area (SP-01, SP-02, and SP-03), which extend to the River Raisin (Appendix 2, Figures 8 through 12) in small channels (rivulets).

The potential for vapor intrusion into structures located east of the property was identified early in TPC's initial investigation work. By May 2011, TPC installed a PRB to treat the contaminated shallow groundwater leaving the Facility. The intent was to treat shallow off-site groundwater and thereby minimize the potential for vapor intrusion at off-site locations. TPC's sampling of indoor air at properties east of the TPC Facility identified a home that required the installation of an SSD system to eliminate exposures through vapor intrusion. By June 2011, the City of Tecumseh had passed a Groundwater Use Ordinance, restricting the use of groundwater in the area near the former TPC Facility and within a 1-block buffer zone around the area of affected groundwater. TPC also connected properties with existing private wells within the restricted area to the municipal water supply, and abandoned 17 existing/historical private water wells identified on 24 of the 272 properties affected by the ordinance. TPC began operation of a SVE system in the northeastern P-Building of the former Facility in April 2012, expanding to

full-scale operation in October 2012, with the joint purposes of reducing the high levels of TCE found in the soil in that area, controlling the migration of soil vapors off-site, and preventing soil vapors from entering the portion of the building that was intended for reuse. By March 2014, TPC had installed and began operation of a Perimeter SVE system at the southern boundary of the property to reduce the potential for the lateral migration of VOCs in soil vapor onto the adjacent site, in addition to reducing concentrations of VOCs in the soil around southern source areas. To date, TPC's has removed approximately 700 kilograms (kg) of TCE from soils under the P-Building and approximately 220 kg of TCE, approximately 95 kg of PCE, and approximately 30 kg of 1,1,1-TCA from soil at the south perimeter of the property during operation of the SVE systems as Interim Measures (approximately 2,300 total pounds of contamination). In 2014, during evaluation of TPC's revised Human Health exposure evaluation, EPA also requested from TPC the installation of SSD systems or sampling of indoor air (depending upon the resident's wishes) at several properties located north of the TPC facility. These cumulative activities were performed as Interim Measures, which are intended to supplement the final corrective measures proposal described herein.

SUMMARY OF FACILITY RISKS

Potential Risks to Human Health

On-site human receptors who have the potential to contact contamination include environmental workers, trespassers, non-routine outdoor workers, routine outdoor workers, and routine indoor workers.

For on-site environmental workers, exposure to contamination may occur from:

- Direct contact (incidental ingestion and dermal contact) with surface and sub-surface soils;
- Inhalation of soil particulates and volatiles into ambient air; and,
- Direct contact with affected on-site groundwater via incidental ingestion and dermal contact.

For non-routine outdoor workers (one-time building construction workers, occasional excavation/maintenance workers, and redevelopment workers) exposure may occur from:

- Direct contact with surface and sub-surface soils;
- Inhalation of soil particulates and volatiles into ambient air;
- Direct contact with affected on-site groundwater via incidental ingestion and dermal contact; and,
- Inhalation of groundwater volatiles in trench air.

Routine outdoor workers (e.g., lawn service or maintenance worker) may be exposed to contamination because of:

- Direct contact with soil;
- Inhalation of soil particulates and volatiles into ambient air; and,

- Hypothetical ingestion and dermal contact with groundwater as tap water.

For Routine Indoor Workers, including occupants of future on-site commercial or industrial buildings, exposure may occur from:

- Inhalation of indoor air impacted by volatile contaminants migrating into a building from affected subsurface soils or groundwater (vapor intrusion).

A trespasser could enter the facility and be exposed to contamination by:

- Direct contact (incidental ingestion and dermal contact) with soils; and,
- Inhalation of soil particulates and volatiles into ambient air.

Surface soil risks are determined to be acceptable for all on-site receptors, except for the on-site routine worker and on-site redevelopment worker. The risk for the on-site routine worker is related to the potential for inhalation of TCE in ambient air due to volatilization from soils with TCE concentrations above a calculated cleanup objective of 27 mg/kg. The most stringent SL for this COC and pathway is 14 ppm pursuant to MDEQ's Part 201 regulations. Soil sample locations with TCE above 27 mg/kg are all located beneath the existing building slab, or were collected below the groundwater surface. The potential for exposure would increase if the existing building slab were removed. Subsurface soil does not pose risks for any receptor. As a result, direct contact (incidental ingestion and dermal contact) with surface and sub-surface soils, and inhalation of soil particulates and volatiles in ambient air represents a minimal risk at the Facility.

Groundwater risks for on-site receptors are acceptable for the construction worker volatile inhalation in trench scenario. A risk from the hypothetical ingestion of contaminated groundwater is driven by TCE, PCE, 1,1-DCE, vinyl chloride, xylenes 1,4-dioxane, and 1,1-dichloroethane; however, that risk is eliminated by the City Groundwater Ordinance, which prohibits the installation or use of groundwater on-site and within an off-site restricted area. There is a slightly elevated noncancer risk for the on-site occasional excavation/maintenance worker from dermal contact with PCE in groundwater. Safety precautions will be needed for excavation work in the southeast corner of the property at AOC-1 (if performed prior to groundwater remediation). In addition, the risk for future on-site indoor workers is unacceptable due to the potential for vapor intrusion from elevated concentrations of PCE, TCE, and vinyl chloride.

Off-site receptors who have the potential to contact affected media include environmental workers, non-routine outdoor workers, routine outdoor workers, routine indoor workers, residents, and recreational users. Of those, the most significant potential for exposure is to routine indoor workers and residents, both of which may be exposed to contamination from:

- Inhalation of indoor air impacted by vapor intrusion from affected groundwater; and,
- Hypothetical ingestion or dermal contact with groundwater as tap water or for domestic purposes.

For recreational users (outdoors), potential exposure can occur from:

- Direct contact with affected surface water via incidental ingestion and dermal contact.

Off-site surface and subsurface soil are not impacted and there are no related risks. However, unacceptable risks for off-site residents exist due to elevated concentrations of TCE, cis-DCE, and vinyl chloride in groundwater via the vapor intrusion exposure route and via the hypothetical groundwater ingestion exposure route. Risks for off-site routine workers are driven by TCE, cis-DCE, and vinyl chloride for hypothetical groundwater use, and are driven by TCE and vinyl chloride for the vapor intrusion pathway. Off-site vapor intrusion risks were further evaluated by sampling soil gas and indoor air.

A survey of existing and out-of-use wells was conducted to identify any potential users of groundwater within the area of known contamination; TPC abandoned all wells that could be located to prevent their future use. Groundwater on-site is not used, and a Groundwater Ordinance was passed to eliminate the potential for on-site and off-site workers and/or residents to ingest contaminated groundwater in the future. The closest municipal wells are located over one-quarter mile west of the Facility, at depths of between 82 and 85 feet bgs. There is no contamination in groundwater migrating off-site in the direction of the well. For these reasons, human exposure to contaminated groundwater by ingestion or direct contact is highly improbable, and the hypothetical groundwater ingestion pathway is an incomplete pathway.

To address off-site groundwater impacts that could contribute to potential vapor intrusion into off-site buildings and homes, TPC implemented quarterly soil gas monitoring. At the east side of the property, a PRB was installed to treat the shallow groundwater beyond the east property line, and create a layer of less contaminated groundwater at the water table surface that would reduce the risk of vapor intrusion. In addition, indoor air monitoring was conducted and results identified that one property required a SSD mitigation system to eliminate the vapor intrusion pathway. North of the Facility, an on-site SVE system was used to reduce the potential for the lateral migration of soil vapors off-site from the Facility. Monitoring of soil gas also occurred north and east of the property, at those properties within 100 feet of the groundwater plume having the potential to be affected by vapor intrusion pathway. Indoor air testing was performed to verify that the vapor intrusion concern was not present or, alternatively, homeowners agreed to the installation of SSD mitigation systems as presumptive remedies to eliminate the vapor intrusion pathway.

On-site engineered and institutional controls will be used to prevent human exposure while contaminated soil and groundwater is being treated. Off-site sampling will be performed to ensure conditions do not change during the treatment process.

<u>Potential Risks to the Environment</u>

Storm water is discharged from the Facility to the River Raisin via Patterson Street under an EPA National Pollutant Discharge Elimination System (NPDES) permit. Given the lack of viable

ecosystems on-site, there is no potential for on-site contamination to impact environmental or ecological receptors. However, contamination has been detected at unacceptable levels in groundwater which migrates beyond the Facility boundary, discharging to the River Raisin, as identified during the GSI investigation. Based on that information, EPA and MDEQ have determined that operations at the Facility have adversely impacted the ecology of the wetland adjacent to the River Raisin. Remedial measures on-site are intended to correct these adverse impacts over the long-term cleanup.

SCOPE OF CORRECTIVE ACTION

EPA's short-term goals for the Facility are:

1. Control all current human exposures to contamination at and from the Facility for which there are complete risk/exposure pathways by eliminating significant or unacceptable exposures for all media known or reasonably suspected to be contaminated with hazardous wastes or hazardous constituents above risk-based levels; and,

2. Stabilize migration of contaminated groundwater at and from the Facility. The migration of all groundwater known or reasonably suspected to be contaminated with hazardous wastes or hazardous constituents above acceptable levels must be stabilized to remain within any existing areas of contamination. In addition, any discharge of groundwater to surface water must not pose an unacceptable risk, or be currently acceptable according to an appropriate interim assessment of surface water.

One of EPA's short-term goals has already been achieved. On August 14, 2017, EPA determined that the Facility met the criteria for Human Exposures Under Control (CA725), superseding EPA's prior "Incomplete" determination made on October 5, 2015. The favorable determination was based on a combination of available indoor air sampling data, and the elimination of exposure pathway through SSD systems and the groundwater ordinance.

EPA determined on October 5, 2015 that the criteria for Migration of Contaminated Groundwater Under Control (CA750) had not been achieved. Achievement of a migration of contaminated groundwater under control determination for the TPC Facility is contingent upon treatment of groundwater to reduce and stabilize groundwater contaminant levels, and to eliminate unacceptable ongoing discharges to the wetland and River Raisin. Treatment of the groundwater will reduce concentrations of COCs in the groundwater, while treatment of the soil in key areas will prevent the potential for the soil to re-contaminate groundwater in the future.

EPA's long-term goals for the Facility are:

1. Protecting human health and the environment by assuring that the Facility poses no unacceptable risk; and,

2. Establishing and maintaining institutional controls.

Final corrective measures for the TPC Facility must ensure that:

1. Soil and groundwater contamination on-site will neither endanger human health nor continue to migrate off-site at levels that represent a continuing potential concern for residential vapor intrusion;

2. Contamination that has migrated off-site by transport in groundwater must be reduced in concentration so it does not endanger human health or require land use restrictions for off-site properties;

3. Institutional and engineered controls to protect human health and the environment on-site will be recorded as RCs in the property deed and will be binding on all future owners of the Facility property, to ensure that those who visit the property will be protected from unacceptable exposure to contamination, including unacceptable exposure to vapor-phase COCs in indoor air within buildings on the property in the future;

4. Construction workers who may perform excavations in areas with remaining contamination will be protected from unacceptable exposure to that contamination and will properly handle contaminated soil in accordance with applicable State and Federal regulations via a Soil Management Plan, which will be added as an amendment to the RC recorded with property deed; and,

5. Contamination is reduced to a level that promotes the natural degradation of contamination, leading to the eventual long-term restoration of the aquifer, and/or elimination of on-site vapor intrusion restrictions.

SUMMARY OF PROPOSED REMEDY COMPONENTS

Current conditions at the Facility indicate that the following exposure pathways exist: 1) hypothetical groundwater ingestion pathway (on-site and off-site); 2) the on-site non-residential vapor intrusion pathway; 3) the off-site residential vapor intrusion pathway; 4) the on-site volatilization to ambient air pathway; 5) the on-site occasional worker groundwater direct contact pathway; and 6) the on-site migration to groundwater (above off-site residential vapor intrusion) pathway. EPA has selected the following remedy components for the Facility.

Soil and Groundwater Remedies

TPC has proposed on-site remediation of soil and groundwater to address impacts above the media cleanup standards. Vapor intrusion controls will be implemented for all current/future buildings at the property in accordance with the Declaration of Restrictive Covenant recorded with the Lenawee County Register of Deeds on September 27, 2016 at Liber 2533 and Page

0341, until the on-site remediation of soil and groundwater meet the media cleanup standards. Mitigation controls will require verification sampling and analysis to document that unacceptable health risk from the exposure pathway has been eliminated, and operations and maintenance reporting will be required until the remedial activities are complete. TPC also intends to address the risk of inhalation of TCE in ambient air by using the Declaration of Restrictive Covenant to require the installation of a similarly protective barrier if the slab is ever removed from affected areas in the future. Interim remedies have been used to eliminate the risk of exposure to contamination at the Facility and in the surrounding area. The purpose of the soil treatment proposed herein is to prevent contaminants in on-site soil from leaching to the groundwater, and re-contaminating groundwater off-site at levels above the most stringent groundwater cleanup goal for vapor intrusion at residential properties, and to reduce levels of contaminants in on-site soil to below the soil cleanup goal for vapor intrusion at nonresidential properties. The purpose of the groundwater treatment proposed herein is to eventually eliminate the need for off-site mitigation systems, restrictions, or testing by achieving the most stringent groundwater media cleanup standard for vapor intrusion at residential properties. These two forms of treatment will eliminate the need for engineering or institutional controls at all off-site properties.

- EPA proposes that TPC treat soil in areas Soil-N1, Soil-N2, Soil-S1, and Soil-S3 (Appendix 2, Figure 13) in addition to the use of the existing RC as an Institutional Controls (IC) and active cleanup using Engineering Controls (ECs). EPA selected these corrective measures considering that interim corrective measures, which include the use of a SVE, are ongoing. Based on an evaluation of the options, EPA selected SVE for treatment of the areas Soil-N1, Soil-S1 and Soil-S3. Contingent on waste classification, EPA recommends either excavation and disposal or in-situ chemical oxidation as the treatment option for area Soil-N2. EPA's selections are based on effectiveness, implementability, sustainability and cost.

- EPA proposes groundwater treatment for TPC to achieve the groundwater corrective measures objectives for four general areas: North On-site, North Off-site, South On-site and South Off-site (Appendix 2, Figure 14). EPA selected these corrective measures considering that interim corrective measures, which include the PRB and SVE are ongoing and provide a complementary strategy to meet the groundwater cleanup levels. Based on an evaluation of the options, EPA recommends enhanced in-situ bioremediation for treatment of the North On-site and South On-site areas, and recommends MNA for the North Off-site and South Off-site areas. EPA's selections are based on effectiveness, implementability, sustainability and cost.

- TPC will use existing ECs and ICs to prevent on-site and off-site exposures during and after soil and groundwater remediation. TPC will provide the EPA with annual written verification that the ECs and ICs described in this Statement of Basis remain in place and are being complied with until such a time that they are no longer necessary. This will include verification with off-site property owners that SSD systems continue to be operated until groundwater cleanup levels are met, verification with the property owner

(100 E. Patterson, LLC or successors) that the requirements of the License Agreement and the New Declaration are being met, and verification with the City of Tecumseh that the Groundwater Use Ordinance remains in effect. Modifications to ECs and ICs are likely to include: 1) site restrictions with monitoring and reporting to confirm that on-site vapor intrusion requirements are being met; 2) documentation attached to the deed and included in an environmental covenant regarding the replacement of impervious surfaces used as ECs to eliminate inhalation to ambient air or other pathways, along with a restriction on future excavations in those areas that may disturb the barriers, unless with prior consent of EPA/MDEQ; and, 3) a Soil Management Plan for EPA/MDEQ approval to prevent the potential redistribution of contaminated soil to less contaminated areas during future excavation and recording the soil handling restrictions on the property deed to assure adherence to the approved Soil Management Plan.

- TPC will continue to provide Financial Assurance in the amount of $5,441,650.00 over the expected lifetime of 15 years, unless additional costs are determined to be necessary, and will provide updated cost estimates for implementation of remedies. Financial Assurance will be maintained at the current level until EPA determines that the on-site and off-site cleanup objectives have been met, after which revisions to cost estimates will include up to 55 years of periodic, long-term, MNA monitoring from certain wells.

EPA will re-evaluate its remedy decision if the Agency learns that conditions have changed in ways which may increase risk of human and/or environmental exposure to contamination, or if any vapor intrusion investigation identifies a complete vapor intrusion pathway. If any concrete slabs or asphalt pavement is demolished or removed from the Facility, EPA will revisit the proposed RC and request modifications. If the use of the property is changed or contamination is identified that requires additional corrective measures, EPA may need to revisit the decisions made regarding the proposed remedy.

EPA developed cleanup goals to address contaminants with concentrations above the media cleanup standards for applicable exposure pathways. The cleanup goals include site-specific values developed by TPC using third-party Risk Based Corrective Action (RBCA) software and spreadsheet calculations, a Seasonal Soil Compartment (SESOIL) model for contaminant migration, and generic MDEQ Part 201 cleanup criteria. Those criteria are identified below along with the respective media and timeframe for cleanup, to identify the requirements and related controls. EPA considers these levels to be appropriate to protect the public and workers.

Table 8: Cleanup Goals for On-Site Volatilization from Soil to Air (Routine Site Worker)
Former Tecumseh Products Company Facility, Tecumseh, Michigan

Detected Contaminant/COC	Soil Volatilization to Ambient Air[1] (mg/kg)	Soil Volatilization to Indoor Air[2] (mg/kg)
Cis-1,2-Dichloroethene	3,360	0.17
Tetrachloroethene	559	1.0

Detected Contaminant/COC	Soil Volatilization to Ambient Air[1] (mg/kg)	Soil Volatilization to Indoor Air[2] (mg/kg)
Trichloroethene	27	0.050
1,2,4-Trimethylbenzene	348	5.9

[1] Calculated Site-Specific Cleanup Level.
[2] Default Screening Criteria. Site specific cleanup level is dependent upon the various parameters of buildings that have not yet been constructed; a site-specific cleanup level may be calculated in the future to determine an appropriate time for SSD system shutdown.
Cleanup levels in mg/kg (parts per million).
Refer to Table 4 of the CMP for further details.
Contaminant concentrations above the levels outlined above require appropriate controls, or cleanup, to be protective of pathway.
Primary cleanup goal for TCE

Table 9: Cleanup Goals for On-Site Non-Residential Groundwater
Former Tecumseh Products Company Facility, Tecumseh, Michigan

Detected Contaminant/COC	GW Volatilization to Indoor Air [1] (ug/l)	Drinking Water Criteria [2] (ug/l)
1,1-Dichloroethane	18,000	441
1,1-Dichloroethene	42,000	7
Cis-1,2-Dichloroethene	32,000	70
Trans-1,2-Dichloroethene	36,000	100
Tetrachloroethene	1,400	5
1,1,1-Trichloroethane	71,000	200
Trichloroethene	1,100	5
Vinyl Chloride	1,100*	2
Xylenes	79,000	10,000
1,4-Dioxane	NA	25
Years to achieve	**2-3**	**55**

[1] Calculated Site-Specific Cleanup Level.
[2] Default Screening Criteria. Site specific cleanup level is based on hypothetical drinking water criteria for MNA demonstration.
Cleanup levels in ug/l (parts per billion).
Refer to Table 5 of the CMP for further details.
* Although a cleanup goal was calculated for vapor intrusion for vinyl chloride in groundwater, vinyl chloride has been absent in soil gas samples. As a result, the cleanup goal for vinyl chloride via vapor intrusion will be the criteria for soil vapor/indoor air.
NA = Not applicable.
Contaminant concentrations above the levels outlined above require appropriate controls until the cleanup goals are achieved,
Primary cleanup goal for TCE

Table 10: Site-Specific Cleanups Goal for Off-Site Residential Groundwater
Former Tecumseh Products Company Facility, Tecumseh, Michigan

Detected Contaminant/COC	GW Volatilization to Indoor Air [1] (ug/l)	Drinking Water Criteria [2] (ug/l)
1,1-Dichloroethane	4,300	205
1,1-Dichloroethene	4,700	7

Detected Contaminant/COC	GW Volatilization to Indoor Air [1] (ug/l)	Drinking Water Criteria [2] (ug/l)
Cis-1,2-Dichloroethene	3,600	70
Trans-1,2-Dichloroethene	4,000	100
Tetrachloroethene	165	5
1,1,1-Trichloroethane	17,000	200
Trichloroethene	130	5
Vinyl Chloride	NA*	2
Years to achieve	**7-15**	**55**

[1] Calculated Site-Specific Cleanup Level.
[2] Default Screening Criteria. Site specific cleanup level is based on hypothetical drinking water criteria for MNA demonstration.
Cleanup levels in ug/l (parts per billion).
Refer to Table 6 of the CMP for further details.
* Vinyl chloride has been present in groundwater but absent in soil gas samples. As a result, the cleanup goal for vinyl chloride via vapor intrusion will be the criteria for soil vapor/indoor air.
NA = Not Applicable.
Contaminant concentrations above the levels outlined above require appropriate controls until the cleanup goals are achieved
Primary cleanup goal for TCE in off-site groundwater

Table 11: Site-Specific Cleanup Goals for Groundwater to Surface Water
Former Tecumseh Products Company Facility, Tecumseh, Michigan

Detected Contaminant/COC	Recreational User Direct Contact [1] (ug/l)	All Surface Water Receptors/Pathways[2] (ug/l)	All Wetland Receptors/Pathways[2] (ug/l)
Acetone	NA	NA	1,700
2-Butanone	NA	40,000	2,200
1,1-Dichloroethane	NA	13,000	740
1,1-Dichloroethene	198,000	2,300	130
Cis-1,2-Dichloroethene	11,600	11,000	620
Ethylbenzene	NA	320	18
Tetrachloroethene	5740	2,900	60
Toluene	NA	2,600	270
Trans-1,2-Dichloroethene	83600	28,000	1,500
1,1,1-Trichloroethane	NA	1,600	89
Trichloroethene	1,570	3,500	200
1,2,4-Trimethylbenzene	NA	310	17
Xylenes	NA	NA	49
Vinyl Chloride	263	NA	13
Years to achieve	**7-15**	**7-15**	**7-15**

[1] Calculated Site-Specific Cleanup Level.
[2] Default Screening Criteria. Site specific cleanup level is based on hypothetical drinking water criteria for MNA demonstration.
Cleanup levels in ug/l (parts per billion).
Refer to Revised Table 7 of the CMP for further details.
* Vinyl chloride has been present in groundwater but absent in soil gas samples. As a result, the cleanup goal for vinyl chloride via vapor intrusion will be the criteria for soil vapor/indoor air.

NA = Not Applicable.
Contaminant concentrations above the levels outlined above require appropriate controls until the cleanup goals are achieved.
Highlighted cleanup goals are more stringent than those for vapor intrusion, and thus, represent off-site groundwater cleanup goal

Table 12: Cleanup Goal for On-Site Soil Vapor/Indoor Air
Former Tecumseh Products Company Facility, Tecumseh, Michigan

Detected Contaminant/COC	On-Site Indoor Air [1] (ppbv)	Off-Site Indoor Air [1] (ppbv)	On-site Soil Vapor [2] (ppbv)	Off-site Soil Vapor [2] (ppbv)
1,1-Dichloroethane	510	120	690,000	41,000
1,2-Dichloroethane	1.2	0.24	1,600	82
1,1-Dichloroethene	210	50	280,000	17,000
Cis-1,2-Dichloroethene	7.3	1.7	9,800	580
Trans-1,2-Dichloroethene	73	17	98,000	5,800
Tetrachloroethene	25	5	33,000	1,700
1,1,1-Trichloroethane	4,600	1,100	6,100,000	360,000
Trichloroethene	1.5	0.37	2,100	120
Vinyl Chloride	12	0.62	15,000*	210*

[1] Indoor Air Screening Levels taken from May 2013 MDEQ Final Guidance Document for the Vapor Intrusion Pathway.
[2] Default Non-Residential Deep Soil Gas Screening Levels (SGSLs) taken from May 2013 MDEQ Final Guidance Document for the Vapor Intrusion Pathway; not applicable for sub slab performance monitoring using vapor pins during the performance monitoring period.
* Vinyl chloride has been absent in soil gas samples but will be monitored during cleanup with respect to soil vapor/indoor air.
NA = Not applicable.
Contaminant concentrations above the levels outlined above require appropriate controls until the cleanup goals are achieved.
Primary cleanup goals for TCE

CRITERIA FOR EVALUATION OF THE PROPOSED REMEDY

EPA evaluates proposed corrective measures by using the following criteria:

1. Overall protection of human health and the environment;
2. Attainment of media cleanup standards;
3. Controlling the sources of releases;
4. Compliance with waste management standards;
5. Long-term reliability and effectiveness;
6. Reduction of toxicity, mobility or volume of wastes;
7. Short-term effectiveness;
8. Implementability; and
9. Cost

EVALUATION OF THE SELECTED REMEDY

The remedies proposed by TPC were evaluated against these criteria to determine whether those criteria will be sufficiently addressed, as described below.

Criteria 1 and 7 will be achieved by implementation of the proposed remedies for soil and groundwater. TPC removed contaminated soils and wastes from the facility during prior RCRA closure and interim corrective action activities. The proposed remedies will further protect human health and the environment by reducing contamination to acceptable levels and by preventing exposure to residual contamination. Short-term effectiveness will be measured through monitoring activities, and the proposed technologies been demonstrated to be effective. Therefore, these criteria will be adequately addressed.

Criteria 2, 3, and 6 will be achieved by installing the SVE systems, implementing excavation and removal of contaminated soil or in-situ treatment, and installing EISB groundwater treatment cells. These remedies will allow conditions at the former TPC to meet the criteria by reducing the volume and mobility of wastes, removing sources of contamination, and attaining media cleanup standards.

Criterion 4 will be met by a combination of past Interim Measures for closure of the Spent Solvent Storage Tank and a Hazardous Waste Drum Storage Area, and by complying with the RC, the Soil Management Plan for excavation within the areas of contaminated soil, and with State and Federal regulations related to the handling and management of wastes.

Criteria 8 will be met, since past Interim Measures at the Facility were implemented successfully and other components of the proposed remedies can be easily implemented based on their extensive history of use in environmental cleanups.

Criteria 5 and 9 are met because the remedies proposed are proven, cost-effective and implementable technologies with long-term effectiveness. The SVE system is expected to remove TCE from new target treatment areas within approximately 4 years. Results from soil samples in the area treated by the current SVE have demonstrated a reduction in contaminant levels. Excavation and disposal would achieve the criteria more rapidly, but at higher costs. EISB for groundwater treatment is also implementable, at reasonable costs, and compatible with the existing microbial degradation in both the treatment area and downgradient through recirculation cells. Maintenance of engineering barriers and adherence to a RC recorded on the property deed will effectively control risks. Monitoring will demonstrate that MNA is and will continue occurring off-site. Financial assurance will insure that the controls remain in place.

The evaluation described in this Statement of Basis demonstrates that the engineered and institutional controls prescribed by the remedy, along with past remedial efforts, will be effective in preventing further off-site releases above the media cleanup standards or other allowable exposure limits, and achieving these threshold criteria.

PUBLIC PARTICIPATION

EPA is soliciting input from the community on its proposed corrective actions for the former TPC Facility in Tecumseh, Michigan, to render the property suitable for continued non-residential use, and for off-site properties to be free from any land-use restrictions or engineering controls. EPA has scheduled a public comment period of 30 days from October 29, 2018 to November 28, 2018 to encourage public participation in the decision process. During the comment period, the public may request a public meeting to discuss the proposed remedies. The public may submit written comments, questions and requests for a public meeting to the following address:

U.S. Environmental Protection Agency, Region 5
Remediation and Reuse Branch (LU-16J)
77 West Jackson Boulevard
Chicago, IL 60604
Attention: Joseph Kelly
kelly.joseph@epa.gov
(312) 353-2111

The administrative record is available for public review at the following two locations:

Tecumseh District Library
215 N. Ottawa Street
Tecumseh, MI 49286
517-423-2238
http://www.tecumsehlibrary.org/
Monday – Thursday 10:00 am – 8:00 pm
Friday, Saturday 10:00 am – 5:00 pm
Sunday 1:00 pm – 5:00 pm (Oct - Apr)

and

U.S. EPA, Region 5 Records Center
77 West Jackson Boulevard
Chicago, IL 60604
Monday – Friday 8:00 am – 4:00 pm (Central Time)

After reviewing and considering the public comments it receives, EPA will summarize the comments and provide a Response to Comments document. EPA will prepare the Final Decision and Response to Comments after the conclusion of the public comment period and include it in the administrative record. Based on comments received and its own finding, EPA may make changes to the proposed corrective measures and document them in the Final Decision and Response to Comments.

APPENDIX 1

ADMINISTRATIVE RECORD INDEX

STATEMENT OF BASIS
TECUMSEH PRODUCTS COMPANY
TECUMSEH, MICHIGAN
EPA ID: MID 005 049 440

ADMINISTRATIVE RECORD
FOR THE

TECUMSEH PRODUCTS COMPNAY SITE
TECUMSEH, LENAWEE COUNTY, MICHIGAN

EPA ID NO: MID 005 049 440

STATEMENT OF BASIS

SEMS ID:

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	942375	2/2/82	Tecumseh Products Company	U.S. EPA	Part A Permit Application and Figures	15
2	942376	5/27/82	Tecumseh Products Company	U.S. EPA	Waste Training Contingency Plan	24
3	942377	6/21/82	Tecumseh Products Company	U.S. EPA	Closure Plan	4
4	942378	6/24/82	Tecumseh Products Company	U.S. EPA	Closure Correspondence	1
5	942379	7/20/82	Tecumseh Products Company	U.S. EPA	Request for Closure	2
6	942380	8/5/82	U.S. EPA	Tecumseh Products Company	Closure Memo	1
7	942381	10/18/82	U.S. EPA	Tecumseh Products Company	Closure Approval	1
8	942382	11/12/82	Mcnamee, Porter, & Seely	U.S. EPA	Closure Certification	1

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
9	942383	3/30/93	PRC Environmental Management	U.S. EPA	Preliminary Assessment/Visual Site Inspection	70
10	942384	6/16/05	MDEQ	City of Tecumseh	NPDES Permit No. MI0020583	31
11	942385	9/21/09	RMT	U.S. EPA	Current Conditions Report	688
12	942386	11/18/09	Crockford, G., RMT	Mullin, M., U.S. EPA	Email Re: Preliminary Onsite Soil Gas Data	5
13	942387	11/20/09	Mullin, M., U.S. EPA	Tecumseh Products Company	Memo Re: Kick-Off Meeting Summary Memorandum	2
14	942388	12/9/09	Crockford, G., RMT	Mullin, M., U.S. EPA	Email Re: Update on Well Install	5
15	942389	1/21/10	Tecumseh Bakery	MDEQ	Baseline Environmental Assessment-Complete	2013
16	942390	2/12/10	RMT	U.S. EPA	Status Update	313
17	942391	2/24/10	Mullin, M., U.S. EPA	Smith, J., TPC	Email Re: Attachment for PCB E-Mail	2
18	942392	2/24/10	Smith, J., TPC	Mullin, M., U.S. EPA	Email Re: PCB Investigations	2
19	942393	3/4/10	U.S. EPA	Tecumseh Products Company	Memo Re: Response to Technical Memorandum	5
20	942394	3/8/10	RMT	U.S. EPA	Memo Re: 2010-03-12 Technical Memorandum Re Mitigation	78
21	942395	3/9/10	Perdomo, S., U.S. EPA	McCure, D.	Email Re: Summary of 3/8 Call	2
22	942396	3/29/10	Mullin, M., U.S. EPA	Crockford, G., RMT	Email Re: Soil Gas Work Plan	7
23	942397	3/29/10	U.S. EPA	Tecumseh Products Company	Final Stamped Order	19
24	942398	3/30/10	U.S. EPA	Tecumseh Products Company	3/29/10 3008(H) AOC - Attached W/Cover Letter	20

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
25	942399	4/8/10	Mullin, M., U.S. EPA	Crockford, G., RMT	Email Re: 3/8 Tech Memo	4
26	942400	4/30/10	Crockford, G., RMT	Mullin, M., U.S. EPA	Email Re: Extent of Vocs in Drinking Water Above Criteria	2
27	942401	5/5/10	Mullin, M., U.S. EPA	Crockford, G., RMT	Email Re: Plume Boundary	2
28	942402	5/6/10	Mullin, M., U.S. EPA	Crockford, G., RMT	Email Re: VI Call	1
29	942403	7/15/10	RMT	U.S. EPA	2Qtr 2010 Progress Report Complete	621
30	942404	8/23/10	Mullin, M., U.S. EPA	File	Attachment VI Next Steps - 08/23/2010 Conference Call Discussion Points	1
31	942405	8/24/10	Mullin, M., U.S. EPA	Tecumseh Products Company	Letter Re: Soil Gas Results	4
32	942406	8/27/10	RMT	U.S. EPA	QAPP	1104
33	942407	10/13/10	Perdomo, S., U.S. EPA	McCure, D.	Email Re: Courtesy Copy of Vapor Intrusion Latter	4
34	942408	10/13/10	Mullin, M., U.S. EPA	Crockford, G., RMT	Letter Re: TPC Off-Site Soil Gas Screening Certified Letter	2
35	942409	2/7/11	Mullin, M., U.S. EPA	Smith, J., TPC	Email Re: Call on Q4 Report	1
36	942410	2/10/11	RMT	U.S. EPA	Memo Re: 2011-02-10 Tech Memo - Sampling for PRB Design	5
37	942411	2/18/11	Quackenbush, MDNR	Mullin, M., U.S. EPA	Email Re: Proposed Restricted Groundwater are and Wellhead Protection	4
38	942412	3/11/11	U.S. EPA	Tecumseh Products Company	Letter Re: Off-Site Vapor Intrusion Mitigation Letter	2
39	942413	3/26/11	McCure, D.	Mullin, M., U.S. EPA	Email Re: 3/11/2011 VI Letter	2
40	942414	3/30/11	RMT	File	Email Re: Attachment to 2011/03/30 Crockford Email - Tech Memo GW Notifications	13

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
41	942415	4/19/11	RMT	MDEQ	Email Re: Discharge Permit for PRB Work Plan TM0275116001-003	3
42	942416	4/19/11	Metz, S., RMT	Quackenbush, MDNR	Email Re: PRB Install with Permit for PRB Memo and 3/30/11 PRB Work Plan Attached	5
43	942417	5/2/11	RMT	U.S. EPA	Memo Re: PRB Work Plan Rev 1	194
44	942418	5/12/11	Mullin, M., U.S. EPA	Crockford, G., RMT	Email Re: Monitoring PRB	4
45	942419	5/19/11	Mullin, M., U.S. EPA	Crockford, G., RMT	Email Re: 2ND Request for PRB Monitoring	1
46	942420	7/8/11	TRC	U.S. EPA	PRB Work Plan Addendum - Revised Performance Monitoring Network	15
47	942421	7/15/11	TRC	File	2Qtr 2011 Progress Report	364
48	942422	9/28/11	TRC	File	Memo Re: Private Wells Survey TM00275115-001A	37
49	942423	9/29/11	TRC	U.S. EPA	Current Human Exposure Under Control Environmental Indicator Report	169
50	942424	10/3/11	TRC	U.S. EPA	Work Plan for SSDS at Building S	28
51	942425	10/19/11	Crockford, G., RMT	Mullin, M., U.S. EPA	Email Re: Permits	7
52	942426	10/19/11	Blathras, C., U.S. EPA	Mullin, M., U.S. EPA	Email Re: Review of Air Calcs	4
53	942427	10/21/11	Bixby, J., MDEQ	Mullin, M., U.S. EPA	Email Re: No Need for MDEQ Permit	1
54	942428	11/22/11	U.S. EPA	Tecumseh Products Company	Letter Re: 2011/11/22 EPA Response to TPC Environmental Indicator Report for Human Health Under Control	2
55	942429	12/5/11	U.S. EPA	Tecumseh Products Company	Letter Re: Environmental Indicator Report for Human Health Under Control	2
56	942430	12/28/11	U.S. EPA	Tecumseh Products Company	Letter Re: Second Response and Extension to Human Health EI Report	2

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
57	942431	1/9/12	Mullin, M., U.S. EPA	Crockford, G., RMT	Email Re: Meeting on VI and GW	1
58	942432	2/20/12	TRC	U.S. EPA	PRB Construction Documentation Report	148
59	942433	2/20/12	TRC	U.S. EPA	S-Building SSDV System Construction Documentation	24
60	942434	3/1/12	Tecumseh Products Company	U.S. EPA	Meeting Agenda	51
61	942435	5/2/12	TRC	U.S. EPA	S-Building SSDV Inspection and Air Results	21
62	942436	5/25/12	TRC	U.S. EPA	Full Scale SVE Work Plan	149
63	942437	5/30/12	U.S. EPA	Tecumseh Products Company	Letter Re: 2012/05/30 EPA Summary Of March 2012 Meeting	5
64	942438	6/19/12	TRC	MDEQ	Request for Mixing Zone-Based GSI Criteria	91
65	942439	6/21/12	TRC	U.S. EPA	Statistical Evaluation of Groundwater Stability	933
66	942440	6/29/12	Crockford, G., RMT	Mullin, M., U.S. EPA	Email Re: Soil Gas and Clay Layer	3
67	942441	7/5/12	TRC	U.S. EPA	Memo Re: Work Plan for Source Area RI	4
68	942442	9/14/12	Crockford, G., RMT	Kelly, J., U.S. EPA	Email Re: GSI	4
69	942443	9/22/12	TRC	U.S. EPA	Permeable Reactive Barrier Monitoring Report	905
70	942444	9/28/12	TRC	U.S. EPA	Remedial Investigation and Groundwater EI Report - Part 1	2838
71	942445	9/28/12	TRC	U.S. EPA	Remedial Investigation and Groundwater EI Report - Part 2	4656
72	942446	10/29/12	U.S. EPA	Tecumseh Products Company	2012/10/29 to 30 EPA Meeting Agenda	13
73	942447	12/5/12	TRC	U.S. EPA	Memo Re: 2012/12/05 TPC Scope Summary	7

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
74	942448	2/1/13	U.S. EPA	Tecumseh Products Company	Letter Re: Denying First Jan 2013 Work Plan for Groundwater	6
75	942449	2/13/13	TRC	U.S. EPA	SVE P-Building Construction Doc Report	777
76	942450	2/19/13	Kelly, J., U.S. EPA	Crockford, G., RMT	Email Re: PIDS and Lack of Information	2
77	942451	2/27/13	TRC	U.S. EPA	Revised Supplemental RI Work Plan and Response to Comments	32
78	942452	3/6/13	U.S. EPA	Tecumseh Products Company	Letter Re: Extension Letter	10
79	942453	6/26/13	Crockford, G., RMT	Kelly, J., U.S. EPA	Email Re: Kelly Questions on PSG	5
80	942454	7/15/13	TRC	File	2Q13 Progress Report	579
81	942455	8/5/13	Crockford, G., RMT	Kelly, J., U.S. EPA	Email Re: HHEI Questions	5
82	942456	8/27/13	Perdomo, S., U.S. EPA	McCure, D.	Email Re: Deficiencies	3
83	942457	8/29/13	TRC	MDEQ	GSI Evaluation and Site Specific Criteria	127
84	942458	9/21/13	Tecumseh Products Company	U.S. EPA	Letter Re: USEPA Concerning 2013/09/12 Conf Call	3
85	942459	9/30/13	TRC	U.S. EPA	Supplement to the Human Exposures EI	260
86	942460	10/15/13	TRC	U.S. EPA	3Q13 Progress Report	144
87	942461	11/22/13	TRC	U.S. EPA	Work Plan to Install SVE System	80
88	942462	12/10/13	MDEQ	TRC	Email Re: Mixing Zone Denial	2
89	942463	1/31/14	U.S. EPA	TRC	Supplement to the Human Exposure EI	34
90	942464	2/18/14	U.S. EPA	TRC	Email Re: Belief of No VI Concerns	6
91	942465	2/20/14	U.S. EPA	Tecumseh Products Company	Letter Re: EPA's Position and Re-Question SOW	8

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
92	942466	3/27/14	TRC	U.S. EPA	Memo Re: Revised SOW	81
93	942467	4/17/14	U.S. EPA	Tecumseh Products Company	Letter Re: 2014/04/17 EPA Letter Response to SOW and Request for Meeting	2
94	942468	5/1/14	U.S. EPA	Tecumseh Products Company	Letter Re: Meeting Agenda for May 2014 Meeting	3
95	942469	5/2/14	Kelly, J., U.S. EPA	Crockford, G., RMT	Email Re: Concerns and Trends	9
96	942470	6/9/14	U.S. EPA	Tecumseh Products Company	2014/06/09 Final Letter Summary of May Meeting	21
97	942471	6/10/14	Kelly, J., U.S. EPA	McCure, D. CMP Law	Email Re: 6/9 McClure Email	12
98	942472	6/18/14	TRC	U.S. EPA	Memo Re: TM 2014 Passive Soil Gas Survey	101
99	942473	6/24/14	Bush, C., MDCH	Kelly, J., U.S. EPA	Email Re: Home Visit	2
100	942474	6/30/14	Kelly, J., U.S. EPA	Crockford, G., RMT	Email Re: Requesting ADDI MIPS Based on PSGS	5
101	942475	7/30/14	Welch, K., TCP	Kelly, J., U.S. EPA	Email Re: Fact Sheet for Vapor Intrusion	1
102	942476	8/14/14	U.S. EPA, MCED, & MDCH	File	Vapor Intrusion Fact Sheet Attached to 2014/8/14 Email	2
103	942477	10/23/14	TRC	U.S. EPA	Meeting Agenda for Conf Call on 3-D Presentation	2
104	942478	12/5/14	TRC/SER	U.S. EPA	MIP Report SER90 Pt 1	463
105	942479	12/5/14	TRC/SER	U.S. EPA	MIP Report SER90 Pt 2	117
106	942481	12/14/14	Kelly, J., U.S. EPA	File	Inspection Report from Nov 2014 Site Visit	38
107	942480	12/23/14	TRC/SER	U.S. EPA	Revised 2014/12/05	2
108	942482	3/26/15	U.S. EPA	Tecumseh Products Company	MIP Work Plan Comments	10

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
109	942483	4/23/15	Kelly, J., U.S. EPA	Crockford, G., RMT	Email Re: Comments on MIP Work Plan	2
110	942484	4/30/15	TRC	File	MIP Investigation Report and Work Plan for High Resolution Site Characterization (Revision 2)	1030
111	942485	5/7/15	Kelly, J., U.S. EPA	Crockford, G., RMT	Email Re: MIP Work Plan	4
112	942486	7/24/15	Tecumseh Products Company	File	Notice of Migration of Contamination	9
113	942487	7/31/15	TRC	File	Supplement to RI EI Indicator Report	5156
114	942488	8/10/15	Kelly, J., U.S. EPA	Crockford, G., RMT	Email Re: 2Q15 Report	4
115	942489	8/20/15	Kelly, J., U.S. EPA	Crockford, G., RMT	Email Re: GSI Email	9
116	942490	9/30/15	U.S. EPA FIELDS Group	U.S. EPA RRB	Trend Analysis-Final	141
117	942491	10/1/15	U.S. EPA	Tecumseh Products Company	Notice Of Violation	164
118	942492	10/5/15	U.S. EPA	File	CA750-NO	8
119	942493	10/5/15	U.S. EPA	File	CA725-IN	8
120	942494	10/15/15	TRC	U.S. EPA	3Q15 Progress Report	176
121	942495	11/6/15	Tecumseh Products Company	U.S. EPA	Letter Re: Nov Response	9
122	942496	12/10/15	U.S. EPA	CMP Law	Letter Re: Summary of 12/8/ Meeting	3
123	942497	12/21/15	Kelly, J., U.S. EPA	Crockford, G., RMT	Letter Re: CMP & CSM Deficiencies	7
124	942498	1/14/16	Kelly, J., U.S. EPA	Crockford, G., RMT	Letter Re: Regarding Status of CMP	3
125	942499	1/15/16	TRC	U.S. EPA	Qtr15 Progress Report	12
126	942500	1/19/16	Kelly, J., U.S. EPA	Crockford, G., RMT	Phone Record	3

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
127	942501	3/2/16	PNC Bank	File	FA Amendment	16
128	942502	3/8/16	Kelly, J., U.S. EPA	MDEQ	Phone Record	2
129	942503	3/18/16	U.S. EPA	Tecumseh Products Company	Letter Re: Conditional Approval/Response to App. E/C	10
130	942504	3/31/16	TRC	MDEQ	Revised GSI Work Plan	135
131	942505	4/12/16	TRC	U.S. EPA	Review of CMP 4/12/16	273
132	942506	4/26/16	Fibertec Environmental Services	AKT Peerless Environmental Services	Building P Data	15
133	942507	7/26/16	Kelly, J., U.S. EPA	TRC & Tecumseh Products Company	Phone Record	2
134	942508	8/2/16	Kelly, J., U.S. EPA	TRC & Tecumseh Products Company	Call Summary	2
135	942509	8/24/16	TRC	U.S. EPA	Summary of 2016 Soil Investigation Activities	556
136	942510	8/29/16	TRC	U.S. EPA	Response to Comments	41
137	942511	8/30/16	Kelly, J., U.S. EPA	TRC & Tecumseh Products Company	Phone Record	2
138	942512	9/8/16	Kelly, J., U.S. EPA	MDEQ, TRC, & Tecumseh Products Company	GSI Phone Record	2
139	942513	9/14/16	Kelly, J., U.S. EPA	Toeroek, TRC, & Tecumseh Products Company	Phone Record	2
140	942514	9/20/16	Kelly, J., U.S. EPA	Toeroek, TRC, & Tecumseh Products Company	Phone Record	2

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
141	942516	9/20/16	TRC	U.S. EPA	HHRA - Final	972
142	942515	9/21/16	Kelly, J., U.S. EPA	Crockford, G., RMT	Email Re: Call Follow-up	3
143	942517	9/21/16	City of Tecumseh	Lenawee County	Recorded Groundwater Ordinance	7
144	942518	9/27/16	Kelly, J., U.S. EPA	Toeroek, TRC, & Tecumseh Products Company	Phone Record	3
145	942519	9/27/16	TRC/100 Patterson LLC	Lenawee County	Declaration of Restrictive Covenant	18
146	942520	10/3/16	Crockford, G., TRC	Kelly, J., U.S. EPA	Email Re: Call Follow Up	2
147	942521	10/3/16	TRC	U.S. EPA	PCE Work Plan	126
148	942522	10/12/16	TRC	U.S. EPA	HHRA Supplement (1 Of 4)	682
149	942523	10/12/16	TRC	U.S. EPA	HHRA Supplement (2 Of 4)	2
150	942524	10/12/16	TRC	U.S. EPA	HHRA Supplement (3 Of 4)	117
151	942525	10/12/16	TRC	U.S. EPA	HHRA Supplement (4 Of 4)	44
152	942526	10/21/16	TRC	MDEQ	Memo Re: Groundwater to Surface Water Migration Pathway and Mixing Zone Request	148
153	942527	11/7/16	TRC	U.S. EPA	Memo Re: Determination of Groundwater Clean-Up Objectives for Vapor Intrusion Under Reasonably Anticipated Current and Future Land Use Scenarios	89
154	942528	11/11/16	TRC	U.S. EPA	Re: Evaluation of Risk Associated with Areas of Interest and Development of Approximate Soil Cleanup Effort Using a Soil Leaching Model	128
155	942529	11/17/16	Toeroek	U.S. EPA	Letter Re: Risk Assessment	3
156	942530	11/18/16	U.S. EPA	Tecumseh Products Company	Response to HHRA	9

NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
157	942531	11/30/16	Perdomo, S., U.S. EPA	Kouimelis, E., Winston & Strawn	Email Re: MCLS	4
158	942532	11/30/16	Crockford, G., TRC	Kelly, J., U.S. EPA	Email Re: TPC Discussion on HHRA Comments	7
159	942533	12/5/16	Crockford, G., TRC	Kelly, J., U.S. EPA	Email Re: Draft Risk	7
160	942534	12/9/16	Crockford, G., TRC	Kelly, J., U.S. EPA	Email Re: Summary of Call	2
161	942535	1/10/17	Burden, D., & Barth, E., U.S. EPA	Kelly, J., U.S. EPA	Email Re: Sesoil Modeling	2
162	942536	1/13/17	TRC	U.S. EPA	Memo Re: Calculation of Risk and Groundwater Cleanup Levels Associated with the Vapor Intrusion Migration Pathway	900
163	942537	1/16/17	TRC	U.S. EPA	Construction Documentation Report 2016 PCE Source Removal	512
164	942538	2/2/17	U.S. EPA	Tecumseh Products Company	Letter Re: Cost Estimate Extension Approval	1
165	942539	2/3/17	Kelly, J., U.S. EPA	Crockford, G., TRC	Email Re: Residential Objective Offsite	4
166	942540	2/8/17	Kelly, J., U.S. EPA	Crockford, G., TRC	Email Re: Residential Objective Offsite	6
167	942541	2/8/17	TRC	U.S. EPA	Risk Assessment Final	913
168	942542	2/13/17	Toeroek	U.S. EPA	Contractor Comments on Appendix A	3
169	942543	3/6/17	TRC	U.S. EPA	Revised Corrective Measures Proposal	1009
170	942544	5/10/17	TRC	U.S. EPA	Email Re: Vapor Intrusion Decision Matrix	2
171	942545	6/27/17	U.S. EPA	Tecumseh Products Company	Letter Re: Mixing Zone Implementation	6
172	942546	7/13/17	Toeroek	U.S. EPA	Review of CMP	2

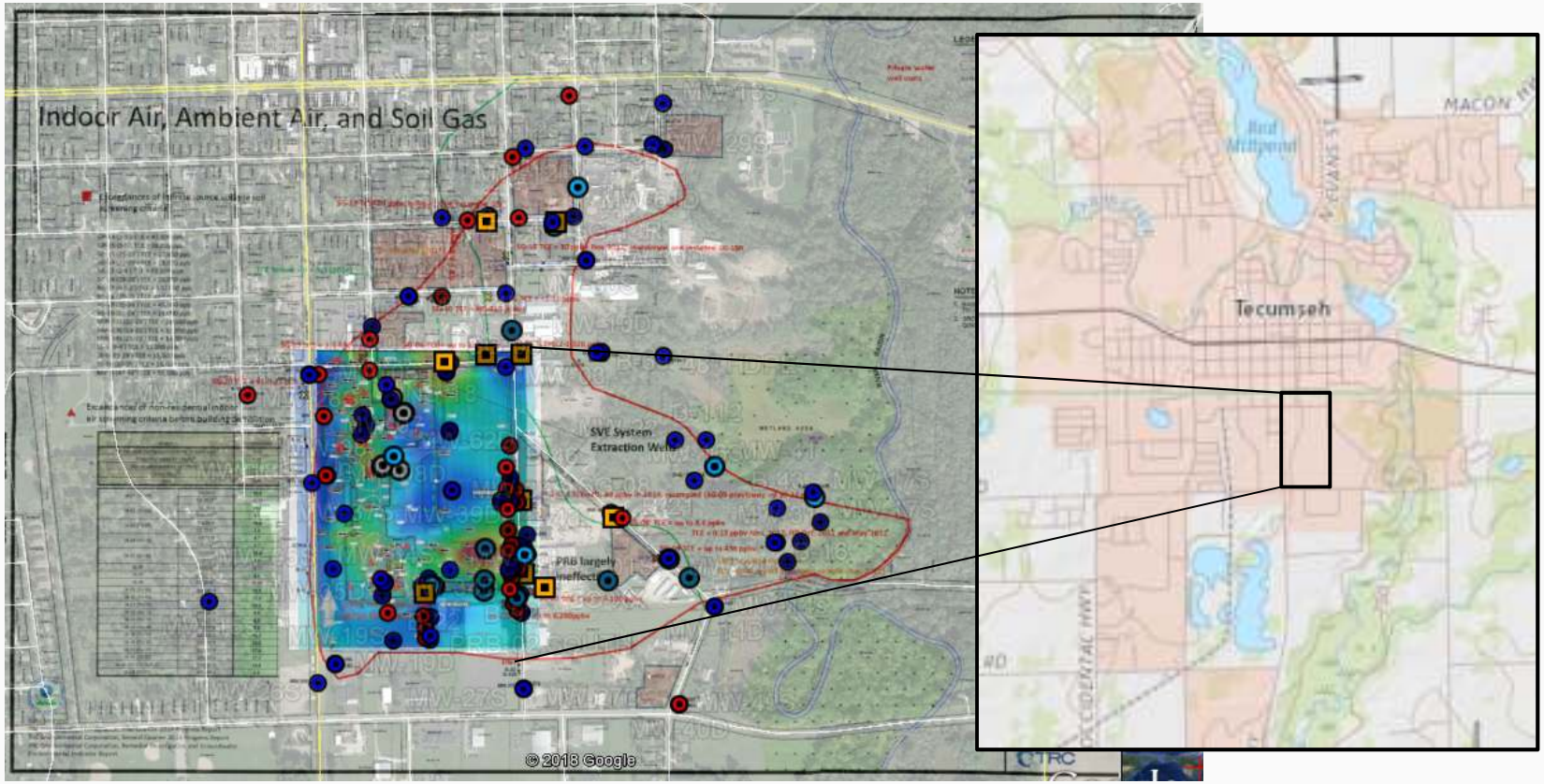
NO.	SEMS ID	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
173	942547	7/17/17	TRC	U.S. EPA	2Q17 Progress Report	326
174	942548	8/14/17	U.S. EPA	File	CA725-YE Human Health Env. Indicator	9
175	942549	9/5/17	MDEQ	Crockford, G., TRC	Email Re: GSI Limits	6
176	942550	9/13/17	Kelly, J., U.S. EPA	Smith, J., TPC, Crockford, G., TRC & Metz, S., RMT	Email Re: Performance Monitoring	8
177	942551	12/18/17	U.S. EPA	Tecumseh Products Company	Conditional Approval of CMP	12
178	942552	1/23/18	U.S. EPA	Tecumseh Products Company	Conditional Approval of GSI	2
179	942553	2/22/18	TRC	U.S. EPA	Revised GSI Performance Monitoring Plan	409
180	942554	5/23/18	TRC	U.S. EPA	Memo Re: TM - 1Q18 Well Install and Sample	153
181	942555	5/23/18	TRC	U.S. EPA	Perimeter SVE Documentation Report	994
182	-	9/18/2018	EPA	-	Statement of Basis	62

APPENDIX 2

FIGURES

STATEMENT OF BASIS
TECUMSEH PRODUCTS COMPANY
TECUMSEH, MICHIGAN
EPA ID: MID 005 049 440

Tecumseh Products Company - 100 E. Patterson Street, Tecumseh, Michigan MID 005 049 440



U.S. Environmental Protection Agency
5/18/2018

Figure 1: Site Location

PATTERSON ST.

HIAWATHA ST.

MUSCODY ST.

SOUTH EVANS STREET

SOUTH MAUMEE ST

"Z"

"S"

SECURITY

"P"

"B-1"

"K"

"H"

"B"

"B-2"

BLUE & GREEN LINE STORAGE

PALLET PACK STORAGE

C.R.S. #1 STORAGE

ENGINEERING

MANUFACTURING

"C"

"D-2"

"P"

SHIPPING STORAGE

"J"

"D"

"E"

BLUE & GREEN LINE STORAGE

"P-2"

SHIPPING STORAGE

"W-1"

"K-1"

"E"

BLUE & GREEN LINE STORAGE

"W-1"

"N-2"

"E"

"F"

C.R.S. #2 & C.R.S. #3 & OUTDOOR UNIT STORAGE

"W-2"

"N-1"

"TD"

"F"

C.R.S. #2 & C.R.S. #3 & OUTDOOR UNIT STORAGE

"L"

CARDBOARD PLASTIC BANDS PAPER

"Y"

COOL PRODUCTS

"G"

COOL PRODUCTS

"R"

COOL PRODUCTS

"X"

"G-2"

"V"

COOL PRODUCTS

"V-2"

COOL PRODUCTS

"M-1"

COOL PRODUCTS

"G"

COOL PRODUCTS

"G-1"

"M"

COOL PRODUCTS

"M-2"

QUALITY

"M-1"

TEARDOWN

"M"

COOL PRODUCTS

"V-1"

COOL PRODUCTS

"MD"

"L"

"X-1"

PARKING

PARKING

GRASS

AREA OF FORMER USTs (#1 - #5)

FORMER UST (#6)

AREA OF FORMER USTs (#15 - #21)

SWMU-1 (FORMER WASTEWATER)

SWMU-3 (FORMER WASTEWATER USTs #9, #10, #11)

SWMU-8 (SCRAP METAL BINS)

SWMU-12 (METAL FINES STORAGE AREA)

STEAM CLEANING ROOM

CHEMICAL STOCK ROOM

PARTS WASHER

BOILER ROOM

PARTS WASHER

ACID WASH FOR RUSTED PARTS

SWMU-10 FORMER SPENT SOVENT TANK

SWMU-11 WASTE OIL STORAGE

SWMU-2 METAL STORAGE BIN

SWMU-8 SCRAP METAL BINS

SWMU-6 HAZARDOUS WASTE DRUM STORAGE

SWMU-4 FINAL HOLDING TANK

NEW WASTEWATER BUILDING

OIL AND FLAMMABLE CHEMICAL STORAGE

VEHICLE MAINTENANCE

COMPRESSOR WASHER AND PAINT LINE

OIL AND FLAMMABLE CHEMICAL STORAGE

SWMU-9 (ACCUMULATION AREA)

SWMU-7 (CITRIC ACID & PHOSPHATE SOLUTION ACCUMULATION AREA)

SWMU-5 (DISTILLATION SOLVENT RECOVERY SYSTEM)

CARDBOARD RECYCLING

LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- TECUMSEH PRODUCTS BUILDING OUTLINE
- PARCEL BOUNDARY
- FENCE LINE
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- APPROXIMATE LOCATION OF FORMER SOLID WASTE MANAGEMENT UNITS (SWMUs)
- APPROXIMATE LOCATION OF HISTORICAL USE AREA

Demolition Key

- PHASE I DEMOLITION AREA (DEMOLITION COMPLETE - 2013)
- PHASE II DEMOLITION AREA (DEMOLITION COMPLETE - 2013)
- PROPOSED DEMOLITION AREA (2017)

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. SEE APPENDIX C OF THE REVISED CORRECTIVE MEASURES PROPOSAL FOR A DESCRIPTION OF SWMUs, UNDERGROUND STORAGE TANKS AND OTHER RELEVANT DATA.

N

0 80' 160' 240' 320'

APPROXIMATE SCALE IN FEET

NO.	BY	DATE	REVISION	APPD.
1	DGS	02/13/17	UPDATE NOTE 2, DEMOLITION AREA; ADD HISTORICAL USE AREA	SEM

PROJECT:

FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE:

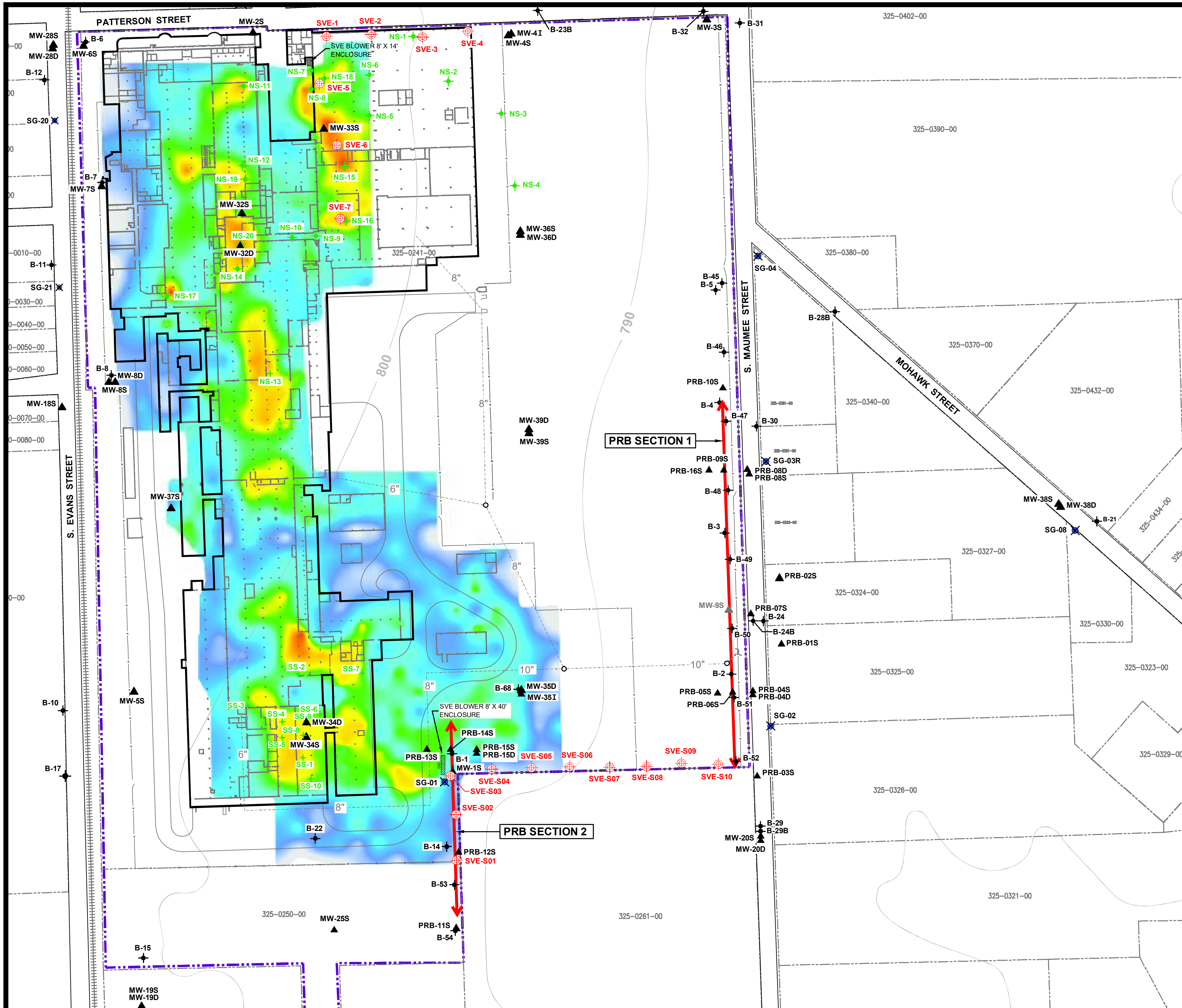
SWMUs & PROCESS AREAS

DRAWN BY:	DStehle	PROJ. NO:	246667.0004
CHECKED BY:	SMetz		
APPROVED BY:	GCrockford		**FIGURE 2**
DATE:	FEBRUARY 2017		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
www.trcsolutions.com

FILE NO: 246667.0004.02.dwg

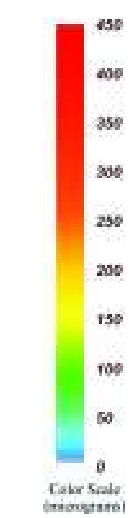
22x34 -- ATTACHED XREFS: bm03109 -- ATTACHED IMAGES:
DRAWING NAME: J:_TRC\Tecumseh Products\Tecumseh MI\246667.0004_Revit CMP\ 246667.0004.02.dwg -- PLOT DATE: March 02, 2017 - 8:59AM -- LAYOUT: FIG2(Site Features & Demo Areas



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- B-54 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- 8" — PIPE DIAMETER AND APPROXIMATE LOCATION OF ON-SITE SANITARY SEWER
- PRB LOCATION
- FENCE LINE
- SVE-S04 — EXTRACTION WELL LOCATION AND NUMBER
- 800 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP

COLOR SCALE FOR RELATIVE RESPONSE FROM PASSIVE SOIL GAS SURVEY - TCE AND BREAKDOWN PRODUCTS



NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. TCE BREAKDOWN PRODUCTS INCLUDE cis-1,2-DICHLOROETHENE; trans-1,2-DICHLOROETHENE; 1,1-DICHLOROETHENE, AND VINYL CHLORIDE.

0 100 200 300 400
APPROXIMATE SCALE IN FEET

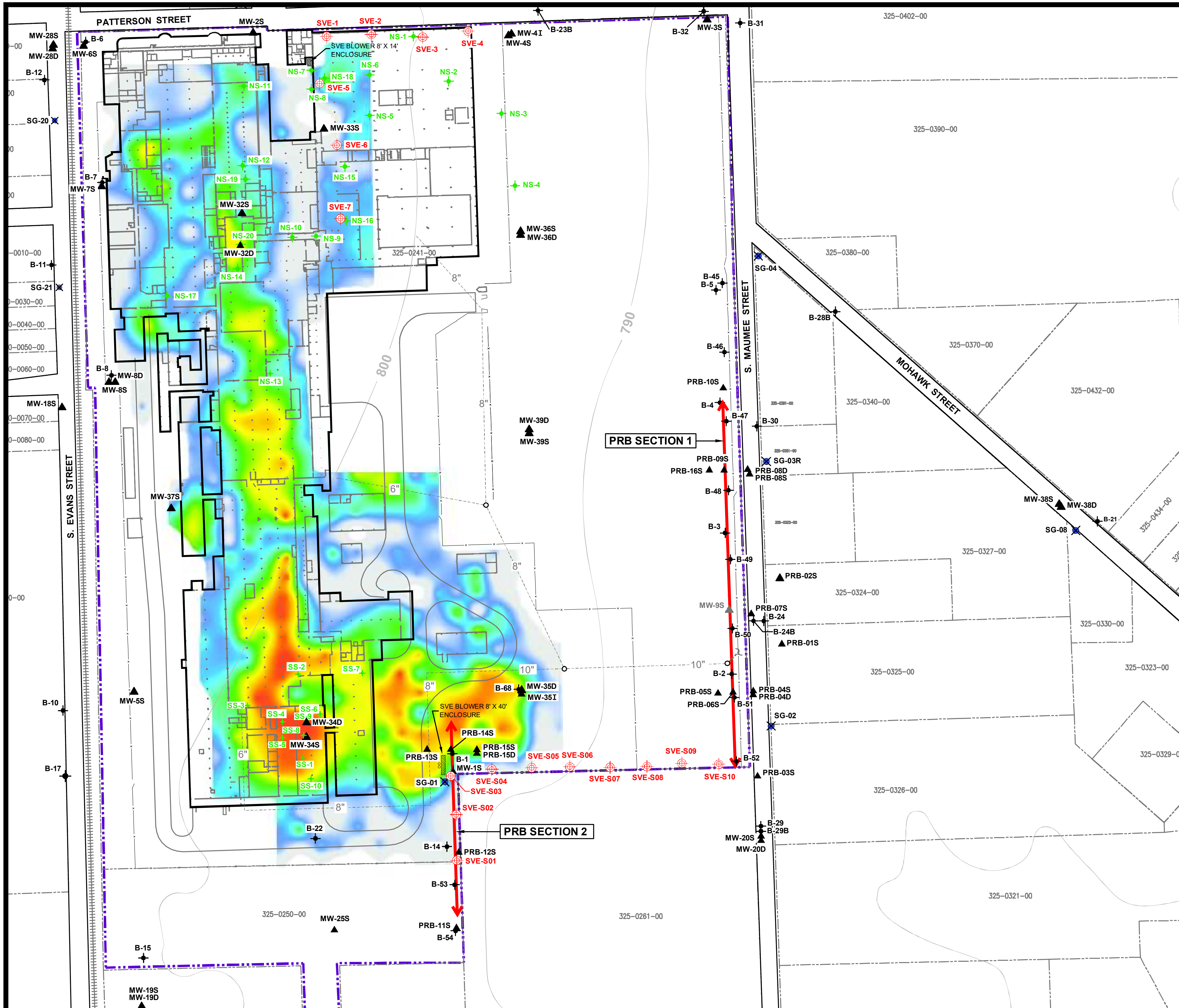
NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE: RESULTS OF PASSIVE SOIL GAS SURVEY
DISTRIBUTION OF TCE AND BREAKDOWN PRODUCTS

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 220003.0000	
CHECKED BY: SEM		FILE NO. 220003.0000.04.dwg	
APPROVED BY: GC	DATE PRINTED:		
DATE: DECEMBER 2014		FIGURE 3	

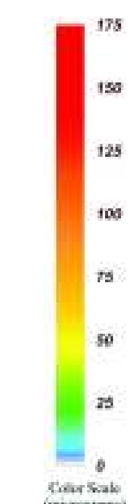
TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- B-54 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- 8" — PIPE DIAMETER AND APPROXIMATE LOCATION OF ON-SITE SANITARY SEWER
- PRB LOCATION
- FENCE LINE
- SVE-S04 — EXTRACTION WELL LOCATION AND NUMBER
- 800 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP

COLOR SCALE FOR RELATIVE RESPONSE FROM PASSIVE SOIL GAS SURVEY - 1,1,1-TRICHLOROETHANE (TCA)



NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.

0 100 200 300 400
APPROXIMATE SCALE IN FEET

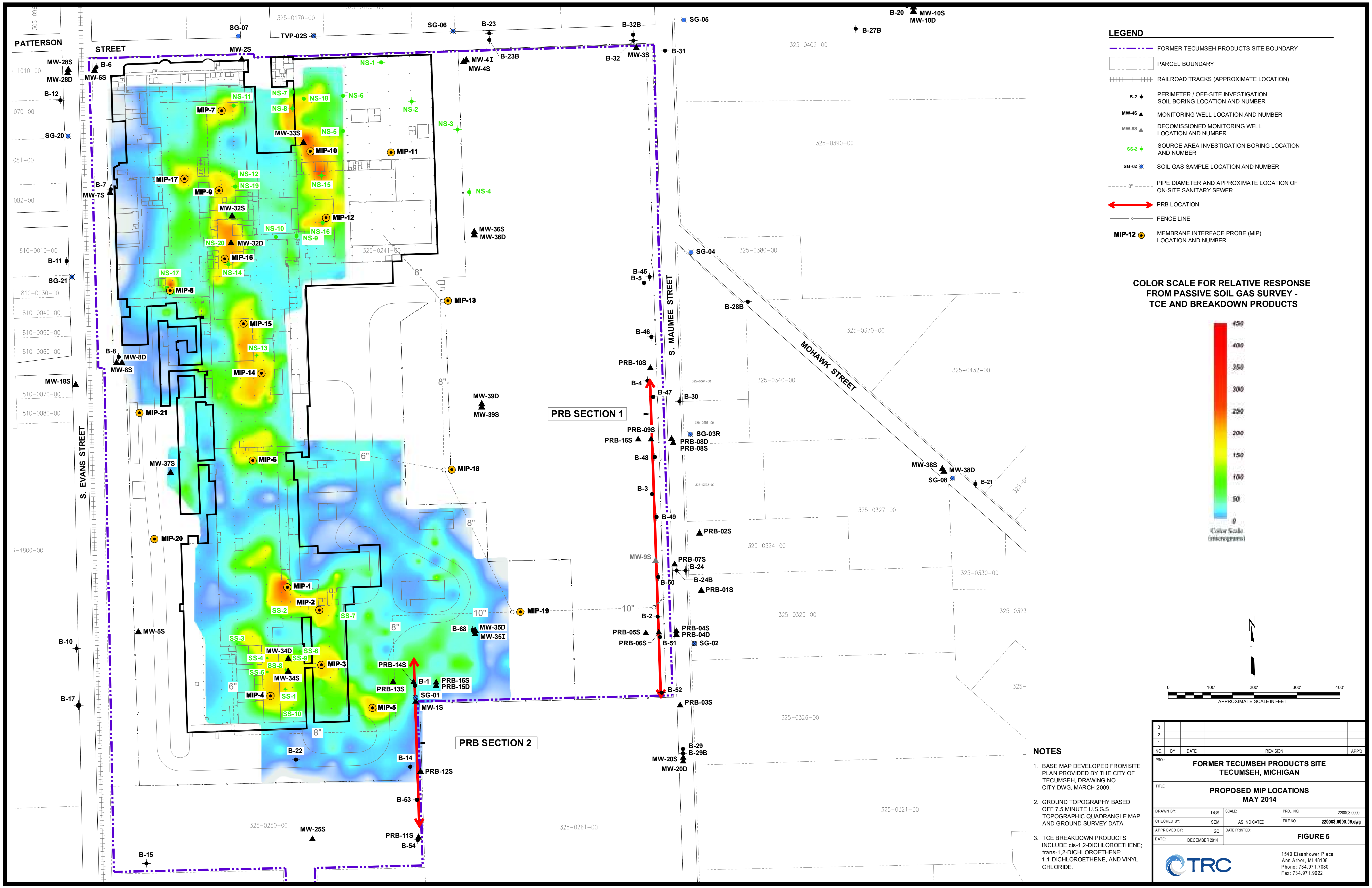
NO.	BY	DATE	REVISION	APP'D
3				
2				
1				

PROJ: **FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN**

TITLE: **RESULTS OF PASSIVE SOIL GAS SURVEY DISTRIBUTION OF TCA**

DRAWN BY: DGS	SCALE: AS INDICATED	PROJ. NO. 220003.0000	
CHECKED BY: SEM		FILE NO. 220003.0000.05.dwg	
APPROVED BY: GC	DATE PRINTED:	**FIGURE 4**	
DATE: DECEMBER 2014			

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108
Phone: 734.971.7080
Fax: 734.971.9022



LEGEND
FORMER TECUMSEH PRODUCTS SITE BOUNDARY
PARCEL BOUNDARY
RAILROAD TRACKS (APPROXIMATE LOCATION)
PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
MONITORING WELL LOCATION AND NUMBER
DECOMISSIONED MONITORING WELL LOCATION AND NUMBER
SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
SOIL GAS SAMPLE LOCATION AND NUMBER
PIPE DIAMETER AND APPROXIMATE LOCATION OF ON-SITE SANITARY SEWER
PRB LOCATION
FENCE LINE
MEMBRANE INTERFACE PROBE (MIP) LOCATION AND NUMBER
COLOR SCALE FOR RELATIVE RESPONSE FROM PASSIVE SOIL GAS SURVEY - TCE AND BREAKDOWN PRODUCTS
450
400
350
300
250
200
150
100
50
0
PATTERSON STREET
S. EVANS STREET
S. MAUMEE STREET
MOHAWK STREET
PRB SECTION 1
PRB SECTION 2
MIP-1
MIP-2
MIP-3
MIP-4
MIP-5
MIP-6
MIP-7
MIP-8
MIP-9
MIP-10
MIP-11
MIP-12
MIP-13
MIP-14
MIP-15
MIP-16
MIP-17
MIP-18
MIP-19
MIP-20
MIP-21
APPROXIMATE SCALE IN FEET
0
100'
200'
300'
400'
NOTES
1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. TCE BREAKDOWN PRODUCTS INCLUDE cis-1,2-DICHLOROETHENE; trans-1,2-DICHLOROETHENE; 1,1-DICHLOROETHENE, AND VINYL CHLORIDE.
FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN
PROPOSED MIP LOCATIONS
MAY 2014
DRAWN BY: DGS
CHECKED BY: SEM
APPROVED BY: GC
DATE: DECEMBER 2014
SCALE: AS INDICATED
PROJ. NO. 220003.0000
FILE NO. 220003.0000.06.dwg
FIGURE 5
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PATTERSON STREET

S. EVANS STREET

S. MAUMEE STREET

MOHAWK STREET

SVE BLOWER 8' X 14' ENCLOSURE

SVE BLOWER 8' X 40' ENCLOSURE

PRB SECTION 1

PRB SECTION 2

SEE INSET MAP 1 FOR ADDITIONAL DETAIL

SEE INSET MAP 2 FOR ADDITIONAL DETAIL

LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- MIP-57 — MEMBRANE INTERFACE PROBE (MIP) LOCATION AND NUMBER
- SVE-S04 — EXTRACTION WELL LOCATION AND NUMBER
- PRB LOCATION
- LATERAL EXTENT OF PCE SOIL SOURCE REMOVED (SEE INSET MAP 1)
- FENCE LINE
- OUTLINE OF PASSIVE SOIL GAS SURVEY AREAS WITH ELEVATED RESPONSE FOR TCE AND BREAKDOWN PRODUCTS

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. SITE FEATURES LOCATED HORIZONTALLY USING THE STATE PLANE COORDINATE SYSTEM RELATIVE TO THE NORTH AMERICAN DATUM OF 1983 (NAD83), INTERNATIONAL FEET, MICHIGAN ZONE SOUTH.
3. ON-SITE SAMPLE DENSITY IS TOO GREAT TO ILLUSTRATE ALL ON-SITE SAMPLE LOCATIONS. SEE FIGURE 12 OF THE REVISED CORRECTIVE MEASURES PROPOSAL FOR AN ON-SITE SAMPLE LOCATION MAP.
4. TCE BREAKDOWN PRODUCTS INCLUDE cis-1,2-DICHLOROETHENE; trans-1,2-DICHLOROETHENE; 1,1-DICHLOROETHENE; AND VINYL CHLORIDE.
5. LATERAL DISTRIBUTION OF ECD RESPONSE MAPPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE TO KRIG MIP DATA.
6. VADOSE ZONE INCLUDES ALL DEPTHS FROM THE GROUND SURFACE TO THE MAXIMUM OBSERVED WATER TABLE (APPROXIMATELY 2 FEET ABOVE THE WATER TABLE AT THE TIME OF THE INVESTIGATION).

INSET MAP 1

APPROXIMATE SCALE IN FEET
0 40' 80'

INSET MAP 2

APPROXIMATE SCALE IN FEET
0 20' 40'

MAXIMUM ECD RESPONSE

- 15,898,923 uV
- 13,911,558 uV
- 11,924,192 uV
- 9,936,827 uV
- 7,949,462 uV
- 5,962,096 uV
- 3,974,931 uV
- 1,987,365 uV
- 0 uV

N

0 100' 200' 300' 400'
APPROXIMATE SCALE IN FEET

NO.	BY	DATE	REVISION	APP'D.
1	DGS	02/13/17	ADD NEW 2016 GROUNDWATER SAMPLE LOCATIONS, NOTES 4&5	

PROJECT:
FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE:
MIP INVESTIGATION RESULTS
DISTRIBUTION OF MAXIMUM ECD RESPONSE IN VADOSE ZONE

DRAWN BY:	DStehle	PROJ. NO.:	246667.0004
CHECKED BY:	SMetz		
APPROVED BY:	GCrockford		**FIGURE 6**
DATE:	FEBRUARY 2017		

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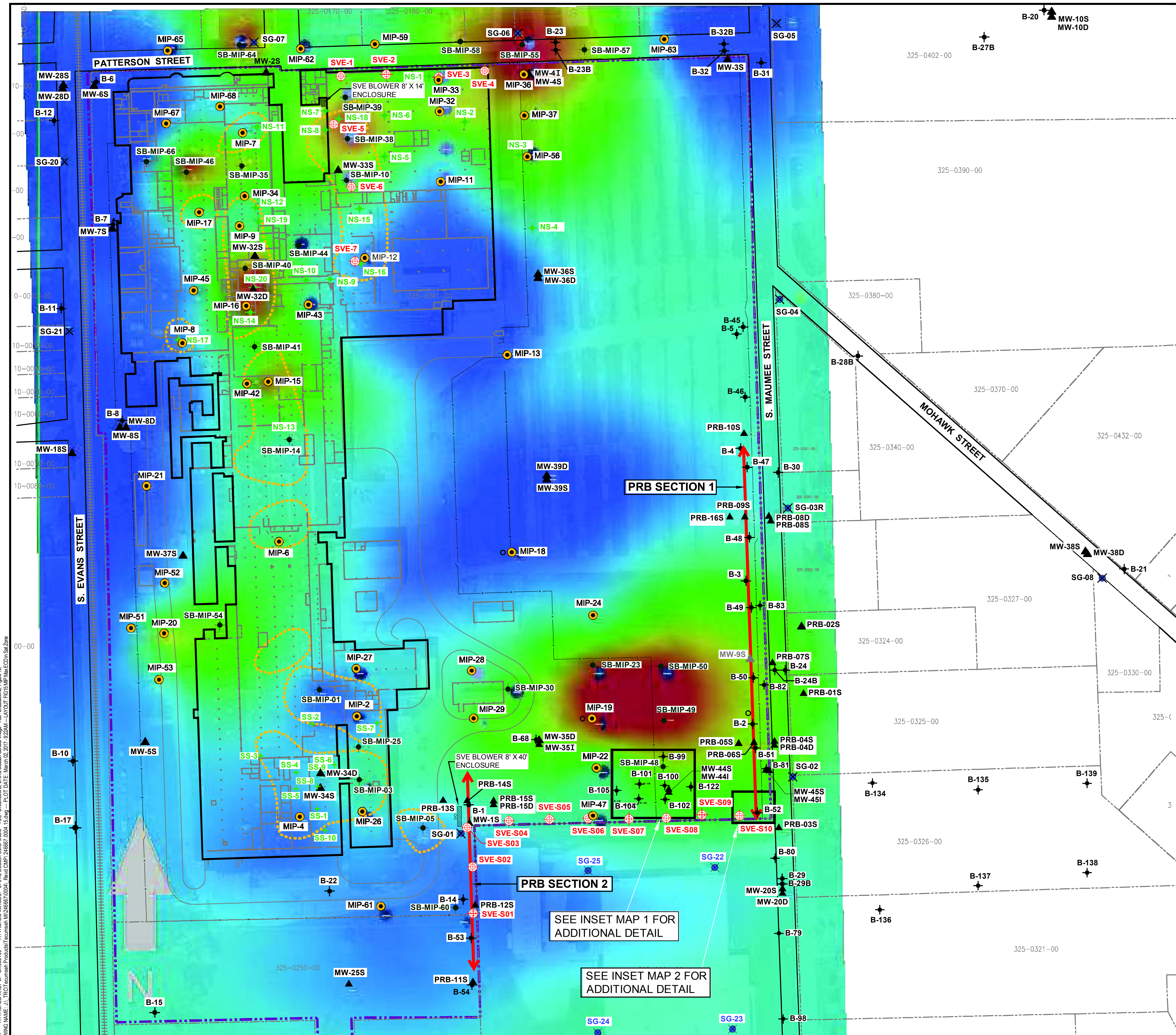
FILE NO.: 246667.0004.14.DWG

22x34 — ATTACHED XREFS: bm03109 — ATTACHED IMAGES: 2704.2 Beacon Color Scale - TCE+Breakdowns; 2704.2 Beacon Contour Image - TCE+Breakdowns; Figure 9
DRAWING NAME: z:_TRC\Tecumseh Products\Tecumseh MI\246667\0004\14.dwg — PLOT DATE: March 02, 2017 - 9:23AM — LAYOUT: FIG 14 MIP Max ECD in Vadose Zone



LEGEND

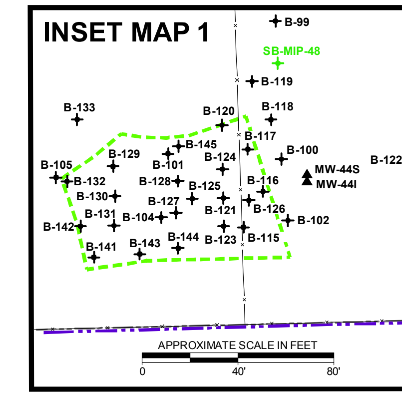
- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- B-2 PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S MONITORING WELL LOCATION AND NUMBER
- MW-9S DECOMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 SOIL GAS SAMPLE LOCATION AND NUMBER
- MIP-57 MEMBRANE INTERFACE PROBE (MIP) LOCATION AND NUMBER
- SVE-S04 EXTRACTION WELL LOCATION AND NUMBER
- PRB LOCATION
- LATERAL EXTENT OF PCE SOIL SOURCE REMOVED (SEE INSET MAP 1)
- FENCE LINE
- OUTLINE OF PASSIVE SOIL GAS SURVEY AREAS WITH ELEVATED RESPONSE FOR TCE AND BREAKDOWN PRODUCTS

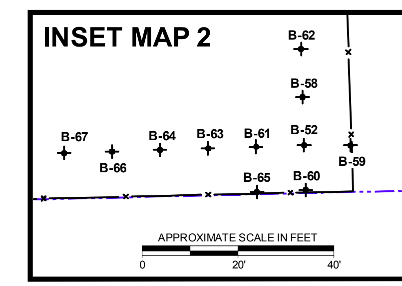
NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. SITE FEATURES LOCATED HORIZONTALLY USING THE STATE PLANE COORDINATE SYSTEM RELATIVE TO THE NORTH AMERICAN DATUM OF 1983 (NAD83), INTERNATIONAL FEET, MICHIGAN ZONE SOUTH.
3. ON-SITE SAMPLE DENSITY IS TOO GREAT TO ILLUSTRATE ALL ON-SITE SAMPLE LOCATIONS. SEE FIGURE 12 OF THE REVISED CORRECTIVE MEASURES PROPOSAL FOR AN ON-SITE SAMPLE LOCATION MAP.
4. TCE BREAKDOWN PRODUCTS INCLUDE cis-1,2-DICHLOROETHENE; trans-1,2-DICHLOROETHENE; 1,1-DICHLOROETHENE; AND VINYL CHLORIDE.
5. LATERAL DISTRIBUTION OF ECD RESPONSE MAPPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE TO KRIG MIP DATA.
6. SATURATED ZONE INCLUDES ALL DEPTHS FROM THE MAXIMUM OBSERVED WATER TABLE (APPROXIMATELY 2 FEET ABOVE THE WATER TABLE AT THE TIME OF THE INVESTIGATION) TO THE SURFACE OF THE UNDERLYING CLAY CONFINING UNIT.

MAXIMUM ECD RESPONSE

15,898,923 uV
13,911,558 uV
11,924,192 uV
9,936,827 uV
7,949,462 uV
5,962,096 uV
3,974,731 uV
1,987,365 uV
0 uV





APPROXIMATE SCALE IN FEET (0, 100', 200', 300', 400')

NO.	BY	DATE	REVISION	APP'D.
1	DGS	02/13/17	ADD NEW 2016 GROUNDWATER SAMPLE LOCATIONS, NOTES 4&5	

PROJECT: FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN

TITLE: MIP INVESTIGATION RESULTS DISTRIBUTION OF MAXIMUM ECD RESPONSE IN SATURATED ZONE

DRAWN BY: DStehle — PROJ. NO.: 246667.0004
CHECKED BY: SMetz
APPROVED BY: GCrockford
DATE: FEBRUARY 2017

FIGURE 7

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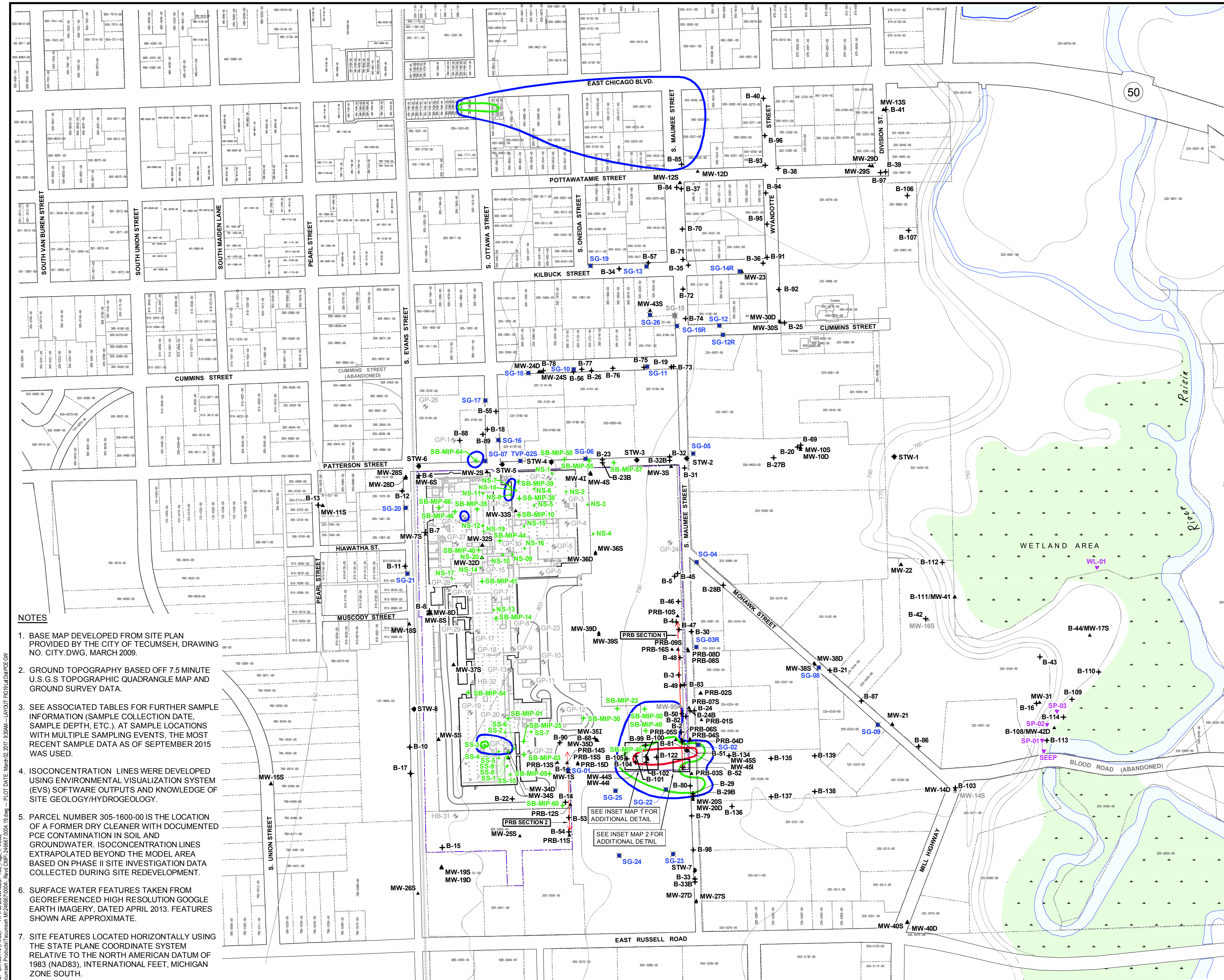
FILE NO.: 246667.0004.15.DWG



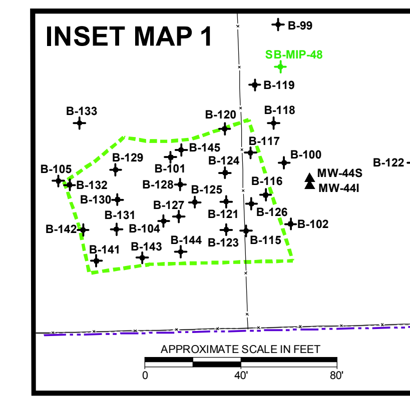
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S MONITORING WELL LOCATION AND NUMBER
- MW-9S DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 APPROXIMATE SURFACE WATER SAMPLE LOCATION AND NUMBER
- GP-2 ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE
- LATERAL EXTENT OF PCE SOIL SOURCE REMOVED (SEE INSET MAP 1)

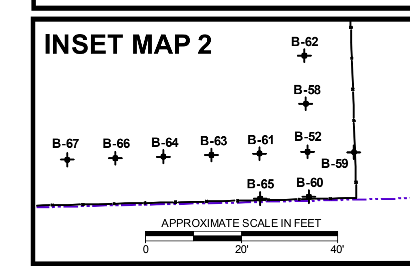
KEY

- EXTENT OF TETRACHLOROETHENE (PCE) ABOVE MICHIGAN PART 201 DRINKING WATER CRITERION (5 ug/L)
- EXTENT OF PCE ABOVE MICHIGAN PART 201 SURFACE WATER INTERFACE CRITERION (60 ug/L)
- EXTENT OF PCE ABOVE THE SITE SPECIFIC CLEANUP LEVEL PROTECTIVE OF THE RESIDENTIAL VAPOR INTRUSION MIGRATION PATHWAY (2,000 ug/L)

INSET MAP 1



INSET MAP 2



APPROXIMATE SCALE IN FEET: 0, 250', 500', 750', 1000'

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE OUTPUTS AND KNOWLEDGE OF SITE GEOLOGY/HYDROGEOLOGY.
5. PARCEL NUMBER 305-1600-00 IS THE LOCATION OF A FORMER DRY CLEANER WITH DOCUMENTED PCE CONTAMINATION IN SOIL AND GROUNDWATER. ISOCONCENTRATION LINES EXTRAPOLATED BEYOND THE MODEL AREA BASED ON PHASE II SITE INVESTIGATION DATA COLLECTED DURING SITE REDEVELOPMENT.
6. SURFACE WATER FEATURES TAKEN FROM GEOREFERENCED HIGH RESOLUTION GOOGLE EARTH IMAGERY, DATED APRIL 2013. FEATURES SHOWN ARE APPROXIMATE.
7. SITE FEATURES LOCATED HORIZONTALLY USING THE STATE PLANE COORDINATE SYSTEM RELATIVE TO THE NORTH AMERICAN DATUM OF 1983 (NAD83), INTERNATIONAL FEET, MICHIGAN ZONE SOUTH.
8. ON-SITE SAMPLE DENSITY IS TOO GREAT TO ILLUSTRATE ALL ON-SITE SAMPLE LOCATIONS. SEE FIGURE 12 OF THE REVISED CORRECTIVE MEASURES PROPOSAL FOR AN ON-SITE SAMPLE LOCATION MAP.

NO.	BY	DATE	REVISION	APP'D.
2	DGS	02/21/17	ADD 2016 MONITORING WELLS, PCE EXCAVATION AREA, NOTE 8	SEM
1	DGS	05/18/16	ADD B-134 THROUGH B-139, ADJUST RIVER LOCATION	SEM

PROJECT:
FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE:
LATERAL DISTRIBUTION OF TETRACHLOROETHENE IN GROUNDWATER

DRAWN BY:	DStehle	PROJ. NO.:	246667.0004
CHECKED BY:	SMetz		
APPROVED BY:	GCrockford		**FIGURE 8**
DATE:	FEBRUARY 2017		

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FILE NO.: 246667.0004.19.DWG

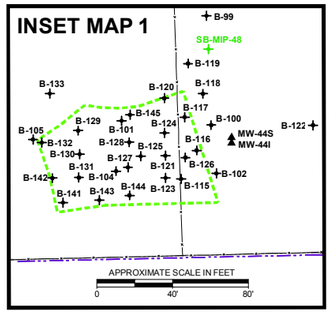
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 + PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S ▲ MONITORING WELL LOCATION AND NUMBER
- MW-9S ▲ DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 + SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 ⊠ SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 ⊠ DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 ◆ STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 ▼ APPROXIMATE SURFACE WATER SAMPLE LOCATION AND NUMBER
- GP-2 ● ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE
- LATERAL EXTENT OF PCE SOIL SOURCE REMOVED (SEE INSET MAP 1)

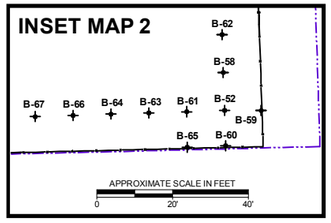
KEY

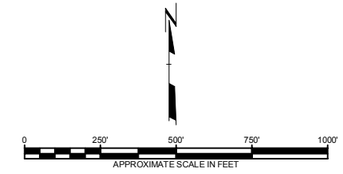
- EXTENT OF TRICHLOROETHENE (TCE) ABOVE THE MICHIGAN PART 201 DRINKING WATER CRITERION (5 ug/L)
- EXTENT OF TCE ABOVE THE MICHIGAN PART 201 GROUNDWATER SURFACE WATER INTERFACE CRITERION (200 ug/L)
- EXTENT OF TCE ABOVE THE THE SITE SPECIFIC CLEANUP LEVEL PROTECTIVE OF THE RESIDENTIAL VAPOR INTRUSION MIGRATION PATHWAY (130 ug/L)
- EXTENT OF TCE ABOVE 2000 ug/L

INSET MAP 1



INSET MAP 2





NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE AND KNOWLEDGE OF SITE GEOLOGY/ HYDROGEOLOGY.
5. SURFACE WATER FEATURES TAKEN FROM GEOREFERENCED HIGH RESOLUTION GOOGLE EARTH IMAGERY, DATED APRIL 2013. FEATURES SHOWN ARE APPROXIMATE.
6. SITE FEATURES LOCATED HORIZONTALLY USING THE STATE PLANE COORDINATE SYSTEM RELATIVE TO THE NORTH AMERICAN DATUM OF 1983 (NAD83), INTERNATIONAL FEET, MICHIGAN ZONE SOUTH.
7. ON-SITE SAMPLE DENSITY IS TOO GREAT TO ILLUSTRATE ALL ON-SITE SAMPLE LOCATIONS. SEE FIGURE 12 OF THE REVISED CORRECTIVE MEASURES PROPOSAL FOR AN ON-SITE SAMPLE LOCATION MAP.

NO.	BY	DATE	REVISION	APPD.
2	DGS	02/21/17	ADD 2016 MONITORING WELLS, PCE EXCAVATION AREA, NOTE 7	SEM
1	DGS	05/18/16	ADD B-134 THROUGH B-139, ADJUST RIVER LOCATION	SEM

PROJECT:
FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE:
LATERAL DISTRIBUTION OF TRICHLOROETHENE IN GROUNDWATER

DRAWN BY:	DStehle	PROJ. NO.:	246667.0004
CHECKED BY:	SMetz		
APPROVED BY:	GCrockford		**FIGURE 9**
DATE:	FEBRUARY 2017		

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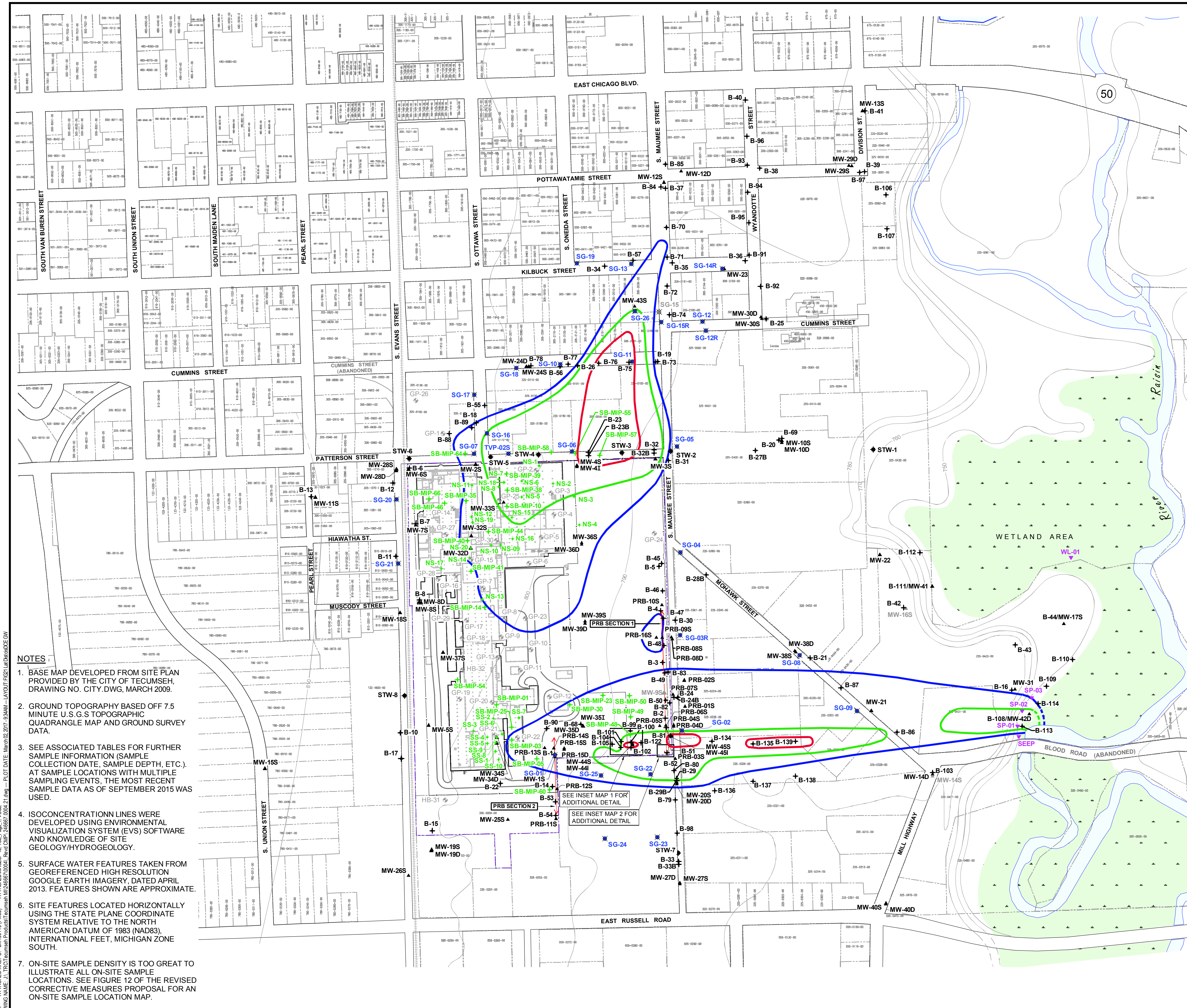
FILE NO.: 246667.0004.20.DWG



NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATIONN LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE AND KNOWLEDGE OF SITE GEOLOGY/HYDROGEOLOGY.
5. SURFACE WATER FEATURES TAKEN FROM GEOREFERENCED HIGH RESOLUTION GOOGLE EARTH IMAGERY, DATED APRIL 2013. FEATURES SHOWN ARE APPROXIMATE.
6. SITE FEATURES LOCATED HORIZONTALLY USING THE STATE PLANE COORDINATE SYSTEM RELATIVE TO THE NORTH AMERICAN DATUM OF 1983 (NAD83), INTERNATIONAL FEET, MICHIGAN ZONE SOUTH.
7. ON-SITE SAMPLE DENSITY IS TOO GREAT TO ILLUSTRATE ALL ON-SITE SAMPLE LOCATIONS. SEE FIGURE 12 OF THE REVISED CORRECTIVE MEASURES PROPOSAL FOR AN ON-SITE SAMPLE LOCATION MAP.

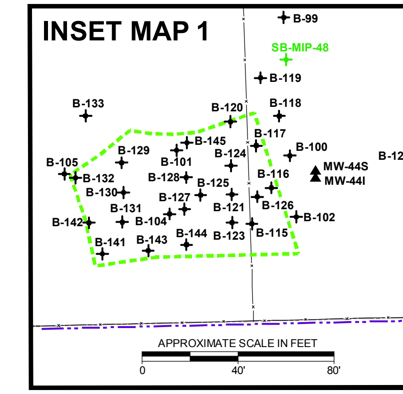
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION AND NUMBER
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE
- LATERAL EXTENT OF PCE SOIL SOURCE REMOVED (SEE INSET MAP 1)

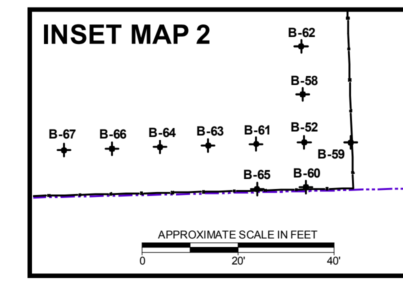
KEY

- EXTENT OF cis-1,2-DICHLOROETHENE (cis-DCE) ABOVE THE MICHIGAN PART 201 DRINKING WATER CRITERION (70 ug/L)
- EXTENT OF cis-DCE ABOVE THE MICHIGAN PART 201 GROUNDWATER SURFACE WATER INTERFACE CRITERION (620 ug/L)
- EXTENT OF cis-DCE ABOVE THE SITE SPECIFIC CLEANUP LEVEL PROTECTIVE OF THE RESIDENTIAL VAPOR INTRUSION MIGRATION PATHWAY (3,800 ug/L)

INSET MAP 1



INSET MAP 2



APPROXIMATE SCALE IN FEET: 0, 250', 500', 750', 1000'

NO.	BY	DATE	REVISION	APP'D.
2	DGS	02/21/17	ADD 2016 MONITORING WELLS, PCE EXCAVATION AREA, NOTE 7	SEM
1	DGS	05/18/16	ADD B-134 THROUGH B-139, ADJUST RIVER LOCATION	SEM

PROJECT:

FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE:

LATERAL DISTRIBUTION OF cis-DICHLOROETHENE IN GROUNDWATER

DRAWN BY: DStehle	PROJ. NO.: 246667.0004
CHECKED BY: SMetz	FIGURE 10
APPROVED BY: GCrockford	
DATE: FEBRUARY 2017	

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FILE NO.: 246667.0004.21.DWG

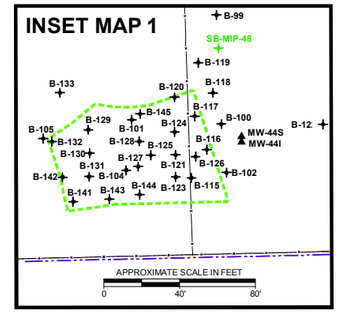
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 ✚ PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S ▲ MONITORING WELL LOCATION AND NUMBER
- MW-9S ▲ DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 ✚ SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 ⊠ SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 ⊠ DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 ◆ STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 ▼ APPROXIMATE SURFACE WATER SAMPLE LOCATION AND NUMBER
- GP-2 ● ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE
- LATERAL EXTENT OF PCE SOIL SOURCE REMOVED (SEE INSET MAP 1)

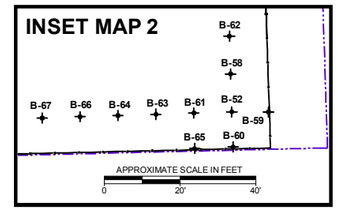
KEY

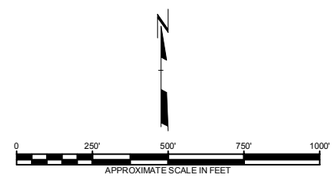
- EXTENT OF VINYL CHLORIDE (VC) ABOVE THE MICHIGAN PART 201 DRINKING WATER CRITERION (2 ug/L)
- EXTENT OF VC ABOVE THE MICHIGAN PART 201 GROUNDWATER SURFACE WATER INTERFACE CRITERION (13 ug/L)
- EXTENT OF VC ABOVE 200 ug/L
- EXTENT OF VC ABOVE 1,000 ug/L

INSET MAP 1



INSET MAP 2





NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE AND KNOWLEDGE OF SITE GEOLOGY/ HYDROGEOLOGY.
5. SURFACE WATER FEATURES TAKEN FROM GEOREFERENCED HIGH RESOLUTION GOOGLE EARTH IMAGERY, DATED APRIL 2013. FEATURES SHOWN ARE APPROXIMATE.
6. SITE FEATURES LOCATED HORIZONTALLY USING THE STATE PLANE COORDINATE SYSTEM RELATIVE TO THE NORTH AMERICAN DATUM OF 1983 (NAD83), INTERNATIONAL FEET, MICHIGAN ZONE SOUTH.
7. ON-SITE SAMPLE DENSITY IS TOO GREAT TO ILLUSTRATE ALL ON-SITE SAMPLE LOCATIONS. SEE FIGURE 12 OF THE REVISED CORRECTIVE MEASURES PROPOSAL FOR AN ON-SITE SAMPLE LOCATION MAP.

NO.	BY	DATE	REVISION	APP'D.
2	DGS	02/21/17	ADD 2016 MONITORING WELLS, PCE EXCAVATION AREA, NOTE 7	SEM
1	DGS	05/18/16	ADD B-134 THROUGH B-139, ADJUST RIVER LOCATION	SEM

PROJECT:
FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE:
LATERAL DISTRIBUTION OF VINYL CHLORIDE IN GROUNDWATER

DRAWN BY:	DStehle	PROJ. NO:	246667.0004
CHECKED BY:	SMetz		
APPROVED BY:	GCrockford		**FIGURE 11**
DATE:	FEBRUARY 2017		

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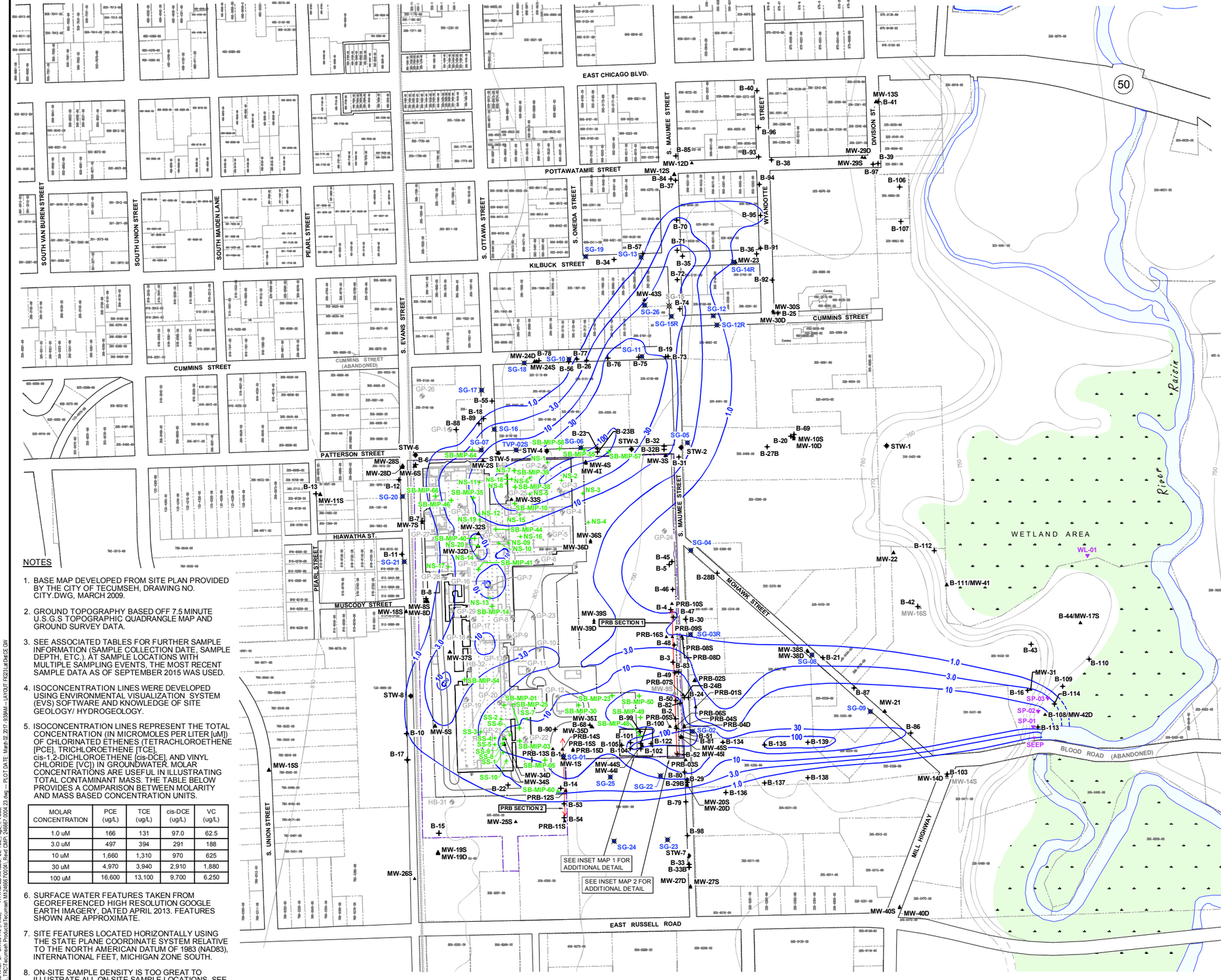
FILE NO.: 246667.0004.22.DWG

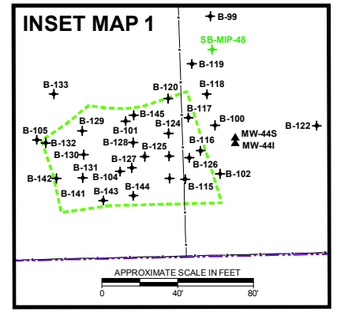
22x34 -- ATTACHED XREFS: bm10110 (Filed) -- ATTACHED IMAGES: TCE_Pkg_1.VOCs
DRAWING NAME: J:\TRC\Tecumseh Products\Tecumseh M\246667\0004_Revit CMP_246667.0004.22.dwg -- PLOT DATE: March 02, 2017 - 8:56AM -- JAYOUT: FS22\LatDistVCGW



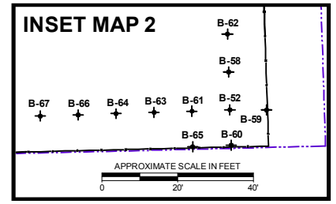
LEGEND

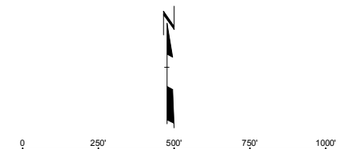
- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 + PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S ▲ MONITORING WELL LOCATION AND NUMBER
- MW-9S ▲ DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 + SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 ⊠ SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 ⊠ DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 ⬟ STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 ▼ APPROXIMATE SURFACE WATER SAMPLE LOCATION AND NUMBER
- GP-2 ● ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE
- 3.0 TOTAL CHLORINATED ETHENE ISOCONCENTRATION LINE (SEE NOTES 3, 4 AND 5)
- LATERAL EXTENT OF PCE SOIL SOURCE REMOVED (SEE INSET MAP 1)

INSET MAP 1



INSET MAP 2





NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SEE ASSOCIATED TABLES FOR FURTHER SAMPLE INFORMATION (SAMPLE COLLECTION DATE, SAMPLE DEPTH, ETC.). AT SAMPLE LOCATIONS WITH MULTIPLE SAMPLING EVENTS, THE MOST RECENT SAMPLE DATA AS OF SEPTEMBER 2015 WAS USED.
4. ISOCONCENTRATION LINES WERE DEVELOPED USING ENVIRONMENTAL VISUALIZATION SYSTEM (EVS) SOFTWARE AND KNOWLEDGE OF SITE GEOLOGY/ HYDROGEOLOGY.
5. ISOCONCENTRATION LINES REPRESENT THE TOTAL CONCENTRATION (IN MICROMOLES PER LITER (uM)) OF CHLORINATED ETHENES (TETRACHLOROETHENE [PCE], TRICHLOROETHENE [TCE], cis-1,2-DICHLOROETHENE [cis-DCE], AND VINYL CHLORIDE [VC]) IN GROUNDWATER. MOLAR CONCENTRATIONS ARE USEFUL IN ILLUSTRATING TOTAL CONTAMINANT MASS. THE TABLE BELOW PROVIDES A COMPARISON BETWEEN MOLARITY AND MASS BASED CONCENTRATION UNITS.

MOLAR CONCENTRATION	PCE (ug/L)	TCE (ug/L)	cis-DCE (ug/L)	VC (ug/L)
1.0 uM	166	131	97.0	62.5
3.0 uM	497	394	291	188
10 uM	1,660	1,310	970	625
30 uM	4,970	3,940	2,910	1,880
100 uM	16,600	13,100	9,700	6,250

6. SURFACE WATER FEATURES TAKEN FROM GEOREFERENCED HIGH RESOLUTION GOOGLE EARTH IMAGERY, DATED APRIL 2013. FEATURES SHOWN ARE APPROXIMATE.
7. SITE FEATURES LOCATED HORIZONTALLY USING THE STATE PLANE COORDINATE SYSTEM RELATIVE TO THE NORTH AMERICAN DATUM OF 1983 (NAD83), INTERNATIONAL FEET, MICHIGAN ZONE SOUTH.
8. ON-SITE SAMPLE DENSITY IS TOO GREAT TO ILLUSTRATE ALL ON-SITE SAMPLE LOCATIONS. SEE FIGURE 12 OF THE REVISED CORRECTIVE MEASURES PROPOSAL FOR AN ON-SITE SAMPLE LOCATION MAP.

NO.	BY	DATE	REVISION	APP'D.
2	DGS	02/21/17	ADD 2016 MONITORING WELLS, PCE EXCAVATION AREA, NOTE 8	SEM
1	DGS	05/18/16	ADD B-134 THROUGH B-139, ADJUST RIVER LOCATION	SEM

PROJECT:
FORMER TECUMSEH PRODUCTS SITE
TECUMSEH, MICHIGAN

TITLE:
LATERAL DISTRIBUTION OF CHLORINATED ETHENES IN GROUNDWATER

DRAWN BY:	DStehle	PROJ. NO.:	246667.0004
CHECKED BY:	SMetz		
APPROVED BY:	GCrockford		**FIGURE 12**
DATE:	FEBRUARY 2017		

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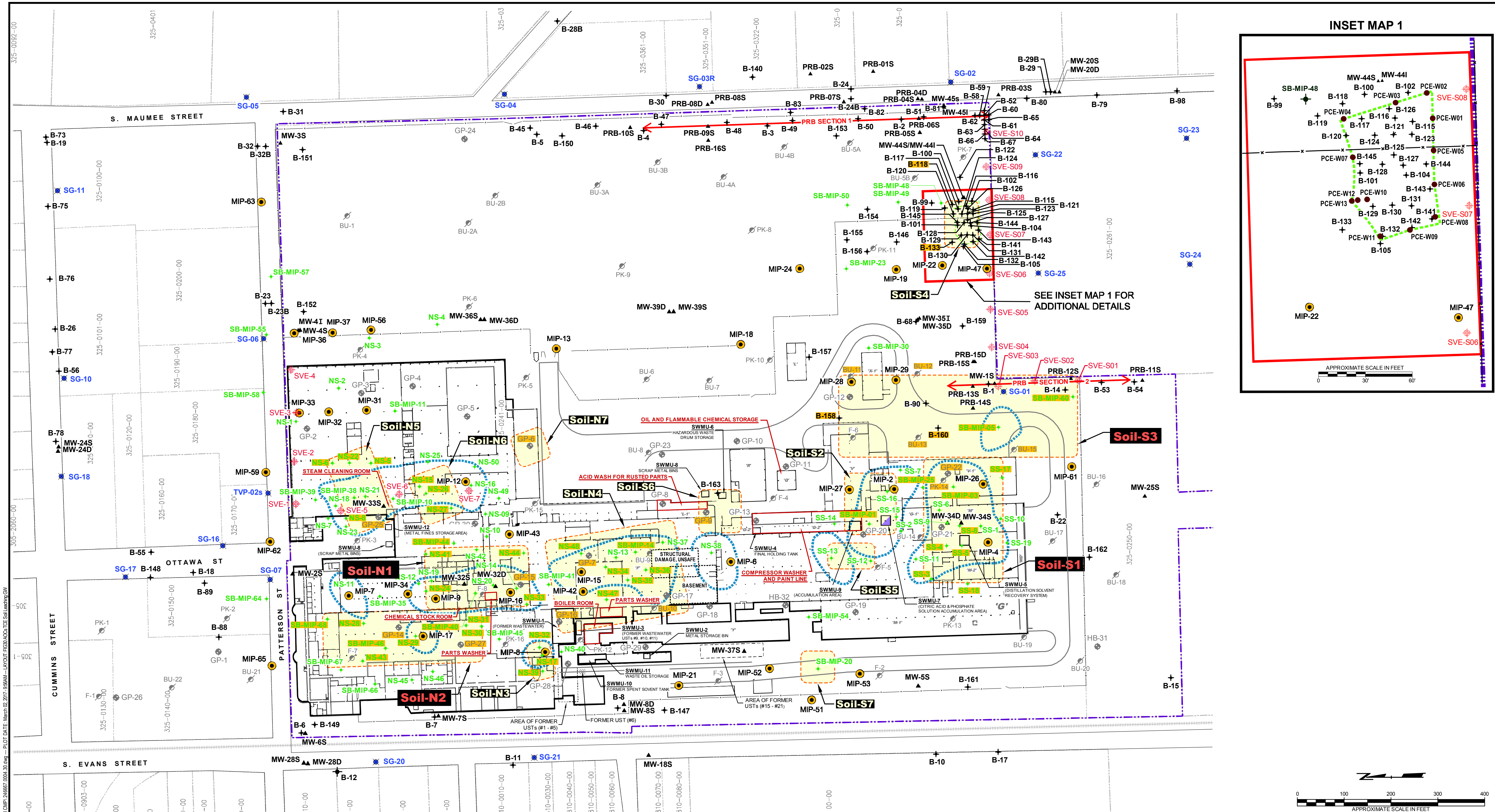
FILE NO.: 246667.0004.23.DWG



LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- FENCE LINE
- PARCEL BOUNDARY
- PRB LOCATION
- B-8 — PERIMETER/OFF-SITE INVESTIGATION BORING LOCATION AND NUMBER
- MW-8D — MONITORING WELL LOCATION AND NUMBER
- SS-10 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- GP-23 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- SVE-7 — SOIL VAPOR EXTRACTION WELL LOCATION AND NUMBER
- SG-01 — SOIL GAS SAMPLE LOCATION AND NUMBER
- MIP-40 — MEMBRANE INTERFACE PROBE (MIP) LOCATION AND NUMBER
- F-7 — AKT BORING LOCATION AND NUMBER
- PCE-W04 — SIDEWALL SAMPLE LOCATION AND NUMBER
- AREA OF FORMER UST
- APPROXIMATE LOCATION OF FORMER SOLID WASTE MANAGEMENT UNITS (SWMUs)
- APPROXIMATE LOCATION OF HISTORICAL USE AREA
- LATERAL EXTENT OF PCE SOURCE EXCAVATION (ALSO SEE INSET MAP 1)
- OUTLINE OF PASSIVE SOIL GAS SURVEY AREAS WITH ELEVATED RESPONSE FOR TCE AND BREAKDOWN PRODUCTS
- NS-30 — ORANGE HIGHLIGHTING INDICATES TCE CONCENTRATIONS IN SOIL GREATER THAN 2.6 MG/KG
- Soil-S5 — YELLOW SHADING DELINEATES THE LATERAL EXTENT OF TRICHLOROETHENE AREAS OF INTEREST. SEE NOTE 3.

NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. SITE FEATURES LOCATED HORIZONTALLY USING THE STATE PLANE COORDINATE SYSTEM RELATIVE TO THE NORTH AMERICAN DATUM OF 1983 (NAD 83), INTERNATIONAL FEET, MICHIGAN ZONE SOUTH.
3. SESOIL/AT123D MODELS ONLY ALLOW NUMERIC LABELING OF SOURCE AREAS AND POCS. IN ORDER TO DISTINGUISH BETWEEN THE SOURCE AREAS AND POCS IN THE NORTHERN AND SOUTHERN AREAS, THESE FEATURES ARE DESIGNATED WITH AN "N" OR AN "S" ON THIS FIGURE. FOR EXAMPLE, THE FIRST SOIL SOURCE INPUT INTO THE SOUTHERN MODEL, CALLED "SOURCE 1" IN THE MODEL FILES, IS DESIGNATED Soil-S1 (SOIL-SOUTHERN 1) ON THIS FIGURE.

PROJECT:	FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN
TITLE:	SOIL AREAS OF INTEREST FOR RISK ASSOCIATED WITH TRICHLOROETHENE LEACHING TO GROUNDWATER
DRAWN BY:	DStehle
CHECKED BY:	SMetz
APPROVED BY:	GCrockford
DATE:	FEBRUARY 2017
PROJ. NO.:	246667.0004
	FIGURE 13
FILE NO.:	246667.0004.30.dwg

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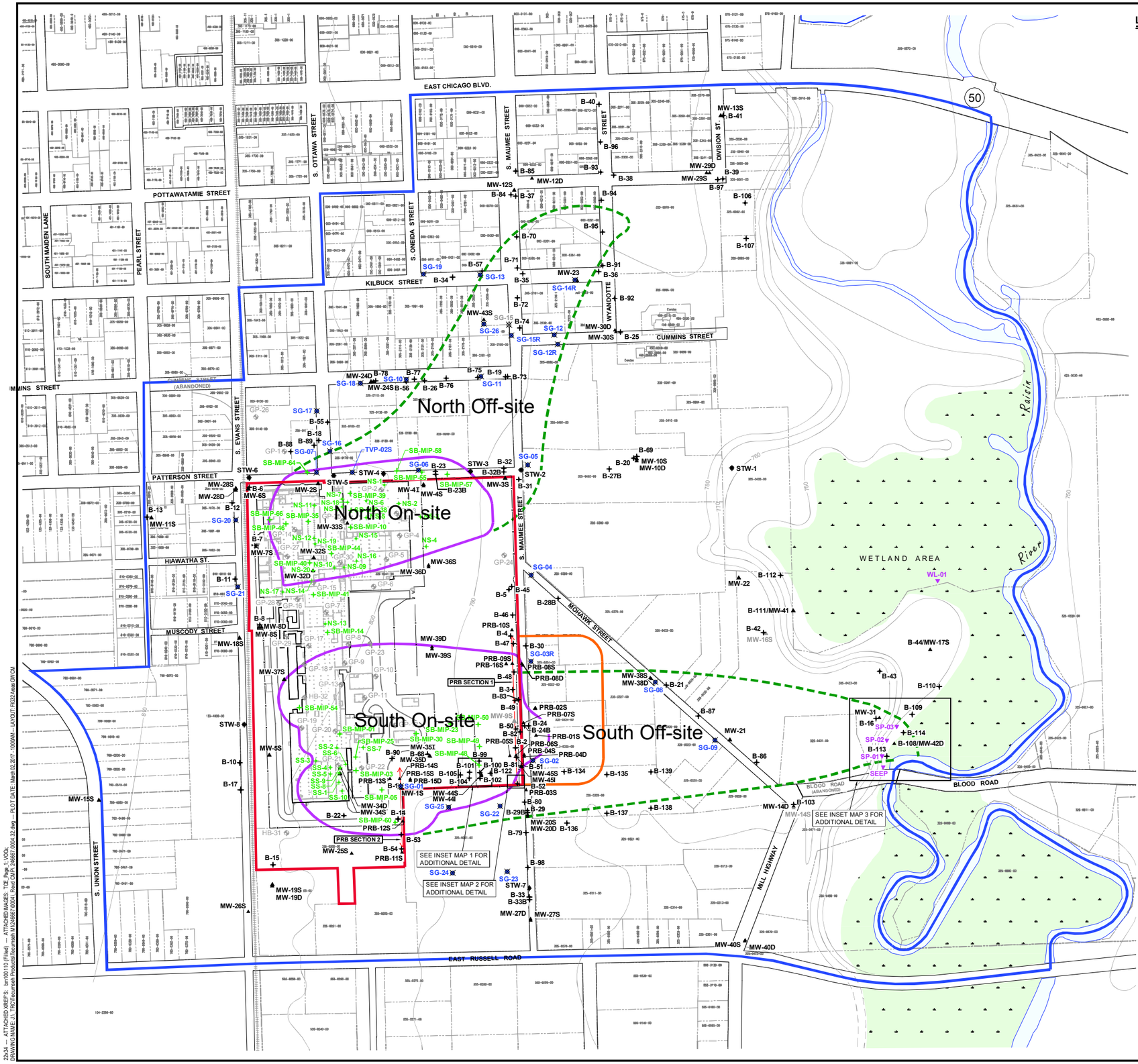


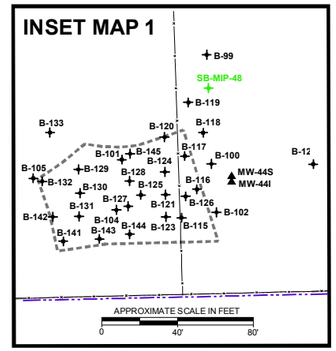
LEGEND

- FORMER TECUMSEH PRODUCTS SITE BOUNDARY
- PARCEL BOUNDARY
- RAILROAD TRACKS (APPROXIMATE LOCATION)
- 750 — APPROXIMATE GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S. TOPOGRAPHIC QUADRANGLE MAP
- B-2 — PERIMETER / OFF-SITE INVESTIGATION SOIL BORING LOCATION AND NUMBER
- MW-4S — MONITORING WELL LOCATION AND NUMBER
- MW-9S — DECOMMISSIONED MONITORING WELL LOCATION AND NUMBER
- SS-2 — SOURCE AREA INVESTIGATION BORING LOCATION AND NUMBER
- SG-02 — SOIL GAS SAMPLE LOCATION AND NUMBER
- SG-15 — DECOMMISSIONED SOIL GAS SAMPLE LOCATION AND NUMBER
- STW-2 — STORM WATER SEWER SAMPLE LOCATION AND NUMBER
- WL-01 — APPROXIMATE SURFACE WATER SAMPLE LOCATION AND NUMBER
- PW-03 — PORE WATER SAMPLE LOCATION AND NUMBER
- GP-2 — ATC PHASE II ESA BORING LOCATION AND NUMBER
- FLOODPLAIN / WOODED WETLAND AREA
- PRB LOCATION
- FENCE LINE
- LATERAL EXTENT OF PCE SOIL SOURCE REMOVED (SEE INSET MAP 1)
- BOUNDARY OF AREA WITH GROUNDWATER USE RESTRICTED BY A CITY OF TECUMSEH GROUNDWATER USE ORDINANCE
- FACILITY BOUNDARY AND BOUNDARY OF AREA SUBJECT TO INSTITUTIONAL CONTROLS FOR VAPOR INTRUSION
- ESTIMATED EXTENT OF PRB GROUNDWATER TREATMENT AREA (EXISTING)
- GROUNDWATER TREATMENT AREA SUBJECT TO RECOMMENDED ENHANCED IN-SITU BIOREMEDIATION (EISB) (SEE NOTE 6)
- GROUNDWATER TREATMENT AREA SUBJECT TO MONITORED NATURAL ATTENUATION

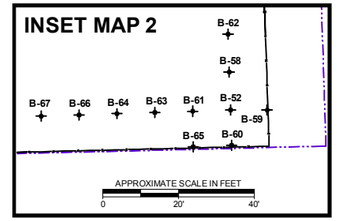
NOTES

1. BASE MAP DEVELOPED FROM SITE PLAN PROVIDED BY THE CITY OF TECUMSEH, DRAWING NO. CITY.DWG, MARCH 2009.
2. GROUND TOPOGRAPHY BASED OFF 7.5 MINUTE U.S.G.S TOPOGRAPHIC QUADRANGLE MAP AND GROUND SURVEY DATA.
3. SURFACE WATER FEATURES TAKEN FROM GEOREFERENCED HIGH RESOLUTION GOOGLE EARTH IMAGERY, DATED APRIL 2013. FEATURES SHOWN ARE APPROXIMATE.
4. SITE FEATURES LOCATED HORIZONTALLY USING THE STATE PLANE COORDINATE SYSTEM RELATIVE TO THE NORTH AMERICAN DATUM OF 1983 (NAD83), INTERNATIONAL FEET, MICHIGAN ZONE SOUTH.
5. ON-SITE SAMPLE DENSITY IS TOO GREAT TO ILLUSTRATE ALL ON-SITE SAMPLE LOCATIONS. SEE FIGURE 12 OF THE REVISED CORRECTIVE MEASURES PROPOSAL FOR AN ON-SITE SAMPLE LOCATION MAP.
6. THE EXTENT OF EISB DETERMINED BY A COMBINATION OF RECIRCULATION CELL FLOW LINES AND THE EXTENT OF TRICHLOROETHENE ABOVE THE CLEANUP LEVEL FOR RESIDENTIAL VAPOR INTRUSION.

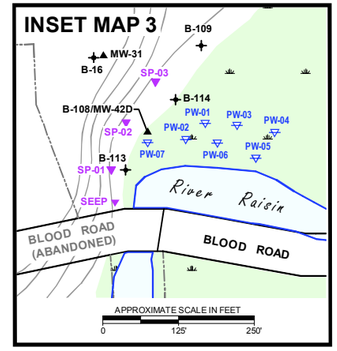
INSET MAP 1

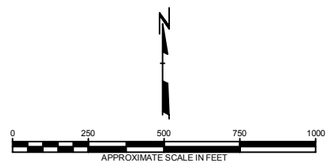


INSET MAP 2



INSET MAP 3





NO.	BY	DATE	REVISION	APPD.
2	DGS	02/13/17	2016 BASEMAP UPDATES; REVISE GW CM AREAS	SEM
1	DGS	05/18/16	ADD B-134 THROUGH B-139, ADJUST RIVER LOCATION	SEM

PROJECT:
FORMER TECUMSEH PRODUCTS SITE TECUMSEH, MICHIGAN

TITLE:
AREAS IDENTIFIED FOR GROUNDWATER CORRECTIVE MEASURES

DRAWN BY:	DStehle	PROJ. NO:	246667.0004
CHECKED BY:	SMetz		
APPROVED BY:	GCrockford		
DATE:	FEBRUARY 2017		

FIGURE 14

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